

1984

# Exploring the psychological impact of office automation in organizational settings two case studies.

Mary Ann L. Schmidt  
*University of Windsor*

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EXPLORING THE PSYCHOLOGICAL IMPACT OF OFFICE AUTOMATION  
IN ORGANIZATIONAL SETTINGS:  
TWO CASE STUDIES

by

Mary Ann L. Schmidt

Hons. B.A., University of Waterloo, 1980

A Thesis  
Submitted to the Faculty of Graduate Studies  
Through the Department of Psychology  
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## ABSTRACT

Analysis of the social and psychological aspects of the implementation and subsequent use of computer technology is often bypassed in favour of a more technically based evaluation by a company (Tapscott, 1982). The purpose of this study was to explore these "people" issues using office employees who, as end users of newly implemented technology, may have concerns regarding the change. These apprehensions might be lessened or alleviated if employees participate in the change to automation (Lucas, 1976, Hall, et al., 1978, Mumford and Banks, 1967). Executing the successful implementation of a technological change, therefore, may be facilitated through direct input from employees.

Ten managerial and 13 clerical employees from a Canadian utility company and 9 managerial and 13 clerical employees from an American computer organization were interviewed. The approximate time for each individual interview was 50 - 60 minutes.

A content analysis was conducted using transcripts from each interview. Major categories were established and chi-square analyses yielded differences between employee levels and companies. Correlational analyses were performed to determine the degree of relation between variables. In-

creased involvement was significantly correlated with job satisfaction and more interesting and challenging work.

Both companies request involvement and input from their employees. Their organizational policies reflect this philosophy, and employees in turn identify themselves as work-oriented individuals. While some respondents indicated minimal involvement as a result of lack of knowledge, employees generally experienced high levels of involvement in the change process, either through participation in decision making or in training following the installation of the automated equipment. Substantial changes to individual jobs occurred, which were typically thought to have enhanced and improved the work process.

In addition, employees reported high levels of job satisfaction following automation, even though stress was also thought to have increased with automation. It was also found that employees desire to be involved in the change process, express interest in continual expansion of job roles and are optimistic toward further technological improvement in their workplace.

Finally, implications regarding implementation strategies and subsequent employee satisfaction and acceptance of the technology were discussed.

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Finally, a personal thank you to my mother for her love and constant encouragement and to my family and friends for their untiring support.

# DEDICATION

I dedicate this thesis to my father, Leonard A. Schmidt, who influenced the continuation of my education in so many ways.



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## CHAPTER I

### INTRODUCTION

Technological advances have exploded in recent years. Two decades ago computers were utilized only by large organizations with the financial backing to operate them. A mini-explosion has occurred in the last four years, pushing computer equipment into the office, schoolroom and the home. Vendors are keen to illustrate how the technology can help in whatever task you undertake. Cost and size were major deterrents in the past but recent innovations in the field of microcomputers have all but eliminated these factors. Computers are becoming part of our daily lives - from scanning computers in our supermarkets to money machines in our banks. As well, computer literacy has become a marketable skill in many organizations. With machinery utilized to decrease effort and time, individuals are slowly joining the once elite "computer literate" population.

Office automation is changing the office as we know it. To fully utilize technology in the office setting, many interconnected terminals are needed. To interact and exchange information the terminals must act as an integrated unit with numerous users functioning as members on the system. Some theorists (Menzies, 1981) have envisioned the "paper-

less" office of the future as a reality. Wherever the new technology leads us, it appears that we will have to adapt and change our styles along with it, otherwise we stand the risk of falling behind the innovators in this fast-paced field. The technology alone will change nothing, individuals hold the machines in their hands - to utilize or reject. This thesis will seek to explore some of the impacts of office automation on individuals in two organizational settings.

### Organizational Change

Organizational change is a slow process which involves many persons and demands a commitment to change. It affects all employees: those who implement the changes and those who readjust in order to work within the new framework of job functions. Computer technology involves a change process, and its acceptance or nonacceptance will be influenced by the attitudes and perceptions of the employees using it.

Acknowledging both the technical and social components of a change may increase acceptance. The technological concerns have long been emphasized in research (e.g., increases in productivity, etc.), but concerns dealing with complex social and organizational problems which occur as a result of organizational change have only recently been explored (Tapscott, 1982). "People" issues in an automated system have in past been largely ignored or bypassed by researchers

and implementors alike. The socio-technical approach attempts to integrate these two aspects.

### **Socio-technical Approach**

The socio-technical approach to research concerning organizational change deals with the interaction of people and technology in order to bring about changes which will benefit both the organization and its individual employees. This approach has been used (Pava, 1982), to explain why organizations with equally modern technology differ in performance. The social and technical aspects of work in the more successful settings appear to enhance each other. This in turn leads to finding a "best match" between the social (people) and technological components of work to ensure high productivity and quality of work life.

Some North American advocates of the socio-technical system have emphasized increased workforce participation as being necessary (Taylor, 1982). Organization members are involved in assessing the problem, collecting data and creating design change proposals. Though this may be the ideal situation, it is seldom the norm.

With technological innovation, participation of employees from all levels has several advantages.

1. It reduces employee fear of interpreting and questioning organizational goals.

2. It reinforces the "team" aspect of change in problem-solving contexts.
3. It creates greater acceptance of the proposed change within the organization, in addition to understanding and commitment by employees from the onset.

Socio-technical systems were introduced when it became apparent that both the people and the technology should be considered in the change process. "The problem (is) neither that of simply 'adjusting' people to technology nor technology to people but organizing the interface so that the best match (can) be obtained between both" (Weir, 1976 p. 85).

It is evident that involving people in the change may be beneficial to the process. Research has focused on this issue from several directions and exploration of the area continues.

### Change Processes

Many years of psychological research offer evidence of processes concerning organizational change. Studies abound in past literature dating back to Taylor's scientific management studies (Buchanan, 1979). Change studies as a result of automation specifically can be found throughout publications from the last twenty years. Socio-technical system design has been explored more often in blue collar occupations than in white collar settings. But, it may potentially be useful in both situations.



In the late 1960's, worker participation in management decision-making was investigated in the British railyards (Hilgendorf & Irving, 1976). Results suggested that the opportunity to be involved in decision-making was welcomed by those employees with positive attitudes toward participation, which in turn increased the worker's desire to seek out additional involvement. Mann and Hoffman (1960) compared attitudes and jobs of employees in a conventional electrical generating plant and in a new, highly automated plant. They concluded that automation created jobs which utilized employee skill and knowledge more effectively. Automation provided greater variety within the job and increased opportunities for learning. Workers reported higher levels of job satisfaction in the automated setting, which the researchers attributed to job enlargement and job rotation.

In another study focusing on white collar workers, Mann and Williams (1960) reported similar conclusions. The change setting was a data processing department where the jobs were not upgraded because of the automation plan. In this situation new jobs were created which required new skills and eliminated the routine and menial clerical jobs. These cases both present automation as a positive change which increased employee's autonomy and skill level.

In the early 1970's, Sumford (1972), undertook additional white-collar research using bank employees in Eng-

land. Up to this point computer systems had been designed to meet technical requirements, while excluding the social aspects of a change to automation. Mumford concluded that the use of employee input and analysis of work functions led to better system designs.

Katz and Kahn (1978) suggest that the socio-technical approach to organizational change can be measured by the "goodness of fit" between the social and technical aspects of an organization. These in turn should be integrated with individual employee needs and abilities. In addition, through the examination of issues at the individual level and determination of how individual needs are satisfied, one may improve overall organizational effectiveness. This outcome alone provides incentive for an organization to seek information from the employee.

The ultimate test of a system is worker acceptance and use of the new technology. Several factors which influence whether a change will be welcomed or rejected will be explored.

#### Some Problems of Change.

Whisler (1970) suggests that the major problem faced by organizations undergoing change is deciding when to introduce the change, what has to be done to obtain the future state, and how to implement the change. Change imposes different costs and benefits on different members of an organization. These differential impacts may make it diffi-

cult to bring about group acceptance of the proposed change. Therefore, they should be dealt with before the system is implemented.

Change is typically introduced into an organization by someone within, who actively encourages and promotes it, and expects acceptance from others involved. Support should occur if individuals believe that the proposed organizational change will benefit them (Whisler, 1970). If the change involves a loss however, the individual will demand some compensation, fight the change or leave the organization. Indifference may occur if the individual does not perceive any effect.

Change, therefore, implies uncertainty. For the employee this includes moving from the known to the relatively unknown as a result of the change. The choice and management of the method of change is, therefore, of crucial importance to acceptance. Two methods of change have been accepted as general applications of the organizational change process - top down and bottom up methods. The former is often referred to as an authoritarian approach whereby the user follows given objectives and instructions implicitly stated in goals and requirements of the organization. This method involves less planning time by top management personnel but typically involves a long implementation period in order to gain commitment and understanding. Using this method it is essential to assess the user's job duties,

needed skills and attitudes and plan ahead before the implementation begins (Tucker, 1982). Users' reaction will be based on their past experience with organizational change. If distrust and fear existed before the change, they will not disappear upon the introduction of a new system.

Bottom up or democratic change stresses "people" aspects ignored by top down change. Employee knowledge and input is utilized making the information gathering period longer, but in turn producing greater commitment to future change and resulting in fewer control mechanisms needed by management. Sharing information with future users and involving them in the choice procedures and decisions in this way has been shown to decrease resistance to the projected change and facilitate the implementation process (Tucker, 1982).

In order to successfully implement a change these considerations must be addressed, as should the following points.

#### Patterns of Successful Change

Beer & Driscoll (1977) outline four aspects of any change process.

1. People must feel pressure in order to change.
2. Participation and involvement of individuals is necessary in order to increase commitment to change and to assure that the change continues.

3. External ideas and concepts from consultants should be utilized. The use of inside or outside consultants must be assessed by individual organizations.
4. Early innovations should be limited in order to ensure early success and to prevent failure midway through the process, bringing with it a decrease in enthusiasm and interest.

These points emphasize the individual employee as an important and necessary component of the change process. Implementation procedures for the change will now be considered.

### Implementation Process

Tapscott (1982) suggests that implementation may be a way of managing change. Change occurs in several areas - in attitudes, organizational factors, and physical and technical areas. Implementation of any new work process may result in some type of resistance by the employee. He labels resistance of change in electronic office systems as "technophobia". Many reasons for resistance or concern have been suggested including fear of the unknown, fear of failure, habit breaking, loss of control, poor past experiences, fear of the technology, lack of personal commitment to the proposed change, and anxiety about future changes from the comfortable, established social interaction pattern. Any or all of these may produce problems and how they are dealt

with will be a major factor in eventual acceptance and ownership of the change.

Lucas (1976) developed a model dealing with information systems in organizations in which implementation was a major component. The use of a system was found to be dependent upon user attitudes, decision style, personal and situational variables and the quality of the information system itself. Important variables to be considered during the implementation stage were involvement, appreciation or merit of the system, user knowledge of system, user perception, systems quality (hardware and software) and performance measures. He concluded that high levels of involvement, appreciation for the system and frequent use of the system were associated with positive user satisfaction.

A study by Hall, et al. (1978) found that when organizational change is imposed, attitudes are less positive than when employees participate or are represented in the change. Mumford & Banks (1967) also concluded that if workers want to participate and anticipate a gain from their efforts, then, initial resistance to the change should be lower.

Most organizations are geared to stability and slow change (Mumford & Banks, 1967). Moreover, organizations differ in their capacity to accept change. Factors which are relevant to successful adaptation of new technology vary but may include the organizational climate or attitude which has prevailed through the years between management and em-

ployees, the organization's previous experience and handling of change, and managerial understanding that technical and organizational change go hand in hand. Skills found in the organization's workforce (as a result of employee age, expectations and objectives) are also relevant. Organizations differ in their ability to mediate change depending upon their established flexibility, human resources and understanding of the change process itself. Individual reactions to change must also be considered within this organizational context (Mumford and Banks, 1967).

Finally, in a study of social change it is important to look at the kinds of strategies employed by the management personnel throughout the implementation stages and the initial use of the system. This includes the exploration of employee needs and goals, how information was communicated to the employees and the extent to which employee consultation was sought. These considerations will be important in assessing the ultimate success or failure of a new computer system.

The change setting of interest in this study is the office environment. This very well known and familiar setting is undergoing massive change as a result of technological advancement, which in time will affect both the office and the employees within it. For many office settings this future is now, with change occurring at a rapid and ongoing pace. Exploration of the implications of change in the off-

ice setting are needed as changes are being implemented at the present time.

### The Office of the Future

Will traditional office settings familiar to us at the present be replaced by informatics equipment? The large majority of researchers believe this is a reality... one which has already begun. With the advent of the electrical typewriter and the photocopier, technological advancement began an invasion which in time will replace current practices (Wallach Scott, 1982). Word processors, backed by computer energy are becoming prevalent in large and small companies in growing numbers. "Machinery" of this sort should increase worker productivity and force changes in jobs and allocated employee tasks. The necessity of increased office productivity has in turn speeded up the automating process (Menzies, 1981). This process removes information from a "paper" format, by transferring it to an electronic storage and retrieval facility. The office of the future could be virtually paperless - sending, receiving and storing mail and memos electronically. Regulation of this sort of work would be made easy with the capabilities of automated equipment on the market at the present time.

Automated office equipment can be described according to basic components - logic, memory and input-output. The microprocessor itself can be described as a computer on a



chip (Menzies, 1981). Integrated circuits (chips) perform basic logic functions previously dealt with by a central processing unit. Memory chips hold information in electronic form and input-output chips allow the unit to interface with the outside world (e.g., via telephone lines, television cables). The combination of these electronic features results in an integrated system allowing for constant change and modification of stored data, processing and editing of new information and internal-external communication channels which were previously unheard of in industry and business.

Information technology is continually changing. The large-scale computers of the 1950's are quickly being replaced by updated "chip" technology (e.g., the microcomputer). Those companies new to information processing are often inundated by the vast numbers of systems which are available on the market. The costs of innovation are high but so are the threats of losing out to the competition. Rather than waiting to see the ultimate potential of the technology, many companies are changing to computer systems and modifying these as new innovations occur.

While the need to automate may be foremost in the mind of company executives, less certainty as to the manner or approach needed to implement the desired change is held. Once again, the socio-technical nature of the proposed changes must be addressed. In the following sections, emphasis will be focused on the social aspects of change, em-

ployee needs and considerations and employee attitudes and concerns.

### **Employee Considerations**

A great deal of literature has been dedicated to areas of concern for the employee. Microtechnology has been suggested as a potential villain with regard to job displacement, deskilling of work, increased monitoring of work, various health and safety concerns (e.g., VDT emissions) and poor quality of working life (McDermott, 1981; Menzies, 1982). It has been suggested that automation leads to boring, monotonous, routine work which increases employee stress levels.

On the other side of the coin are those studies which tell us that office automation will increase the capabilities of the service or "knowledge" worker allowing them access to more information and greater capacity to use it productively (Tapscott, 1982). Increased decision-making functions and less supervision may enlarge the employee's job. Using the computer terminal, the task which in past had taken a morning, may be completed within a fraction of the time and with less legwork and time-consuming data collecting functions (e.g., file searching). The individual employee may or may not view this as a benefit depending upon their desire to enrich their position in the workplace.

Change will inevitably cause some degree of anxiety for all employees. The environment which had existed is changed, people are forced to learn new tasks, and social and business norms are in flux. Roles, interactions and levels of status may be modified. Tucker (1982) found employees who were involved in and knowledgeable about the change process experienced less anxiety than their uninformed co-workers. Given the fact that robots are replacing assembly workers, it may seem plausible that computers will infringe on office employment. Employees may fear losing their jobs as a result of automation. If employees are assured that change will not lead to fewer jobs but rather retraining and transfer, acceptance will increase. Employees may be threatened by the apparent complexity of "the machine" and feel overpowered by it. Adequate hands-on experience and training usually dispels this fear.

Automation may also be linked to loss of freedom on the job and fewer social contacts. This may involve the elimination of a walk down the hall to the filing cabinet (and the socializing along the way) to a general feeling of isolation dealing with a machine rather than a person. Isolation is definitely a factor which must be considered. It can occur in the office setting - word processing "pools" are excellent examples of restricting the autonomy of the worker. Individual work stations may become so self-contained, that the employee will not need to stray far from

the station. This may increase overall productivity, but social problems could be manifest as undesirable outcomes. Since the work environment appears to be an important aspect of quality of working life, information regarding job design, equipment set-up and the social implications resulting from technological changes should be discussed with the worker before the changes are implemented.

Environmental factors such as these have been mentioned by workers as being the most important components in completing their required job duties (Galitz, 1980). The office environment includes lighting, acoustics, temperature, work-station design and general set-up of an office. Issues in the lighting area include natural light, illumination levels, glare and ambient/task lighting. Acoustics involve privacy concerns, noise control and general office layout. Work-station design and general office design must be assessed in terms of the usual flow of people and information through the office. Many of these issues can and should be assessed during the implementation phase.

Access to information or lack of access will influence an employee's perception of a computer system (Tapscott, 1982). Is adequate information readily accessible to the person in order for them to carry out their job? Information in a service organization may determine the organizational power structure. Those with the knowledge and the seniority to obtain information may use or abuse it. The

issue of electronic monitoring and checking of productivity levels may result in the employee feeling a lack of control in their job.

Changes such as these alter the organization as a whole, both the structural and the people aspects. While problems will arise because of the new technology, new benefits which may enhance the job should be pointed out and emphasized. Adaptation depends on positive organizational attitudes and individual integration of job and system. "Increased productivity can be realized if harmony is fostered among the three elements involved in automation: people, the organization and technology" (Martin, 1982 p. 34).

Management may face the dilemma of not fully knowing the benefits of a system until money has been invested. Individuals, on the other hand, may not comprehend how automation can help them to do their work. While it may be easy for the technicians to quote prices, benefits and functional jargon to company personnel, they seldom understand users' anxieties and fears of being unable to master the seemingly complex new technology. Nor do technicians understand individual differences. Individuals differ in their values, in what they perceive as rewarding, in their need for autonomy and involvement, work patterns, social interactions and their need for training, support, encouragement and information (Martin, 1982). Thus, individual differences should be considered an important aspect of the change process.

### User Needs

Workers who acquire new skills and expertise may feel they should be given appropriate rewards. These reward systems vary across individuals. While one person may require only verbal praise, another may demand monetary rewards (Martin, 1982). The way in which individuals respond to change may influence their personal acceptance or rejection of it. This factor may be more critical than implementation factors or methods of change used, in the final analysis of system success.

Individuals must be willing to adapt, learn and change in order to remain in an organization which is automating. As part of an organization they become a unit which in turn, may decrease individual creativity, motivation and productivity. By focusing on individuals within the system and capitalizing on their willingness to become involved, managing organizational change may be simplified.


The needs of users are of utmost importance. Increased emphasis ought to be placed, therefore, on user need and involvement from the initial stages of change. Users of office automation systems are not experienced programmers or system analysts. They typically have had little or no hands-on experience with computer terminals and terminology making both the hardware and software alien to the new user. The complex system does not offer challenge, but rather frustration and annoyance to those with inadequate training.

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Because of this, vendors are designing "user-friendly", interactive systems, to help new users by providing menus to choose from and programs which are easily deciphered. Another necessary component involves planned education and training of users along with continuing education as users' needs evolve and diversify. This "user-driven" design (Tapscott, 1982), emphasizes the capabilities of "knowledge workers" by considering their needs. User participation in this design is required from the onset and human factors are a large part of both the design and implementation of the office system.

One other consideration that should be acknowledged is the fact that office workers may not choose to learn how to use computer equipment, they may be forced to learn. In contrast, programmers become users deliberately and may not experience some of the problems associated with stressful working conditions (e.g., eye-related strain, stress etc.). Wynn (1982) reports that this stress may mark the difference between monotonous, meaningless work and exciting, challenging work as interpreted by the two groups of employees previously mentioned.

Preconceived attitudes may predict users' involvement and satisfaction with the system (Tucker, 1982). Negative exposure to computers may influence the employee's attitude. Experiences with malfunctioning technical equipment in situations outside the office may increase the possibility that new technology in the office may be viewed with skepticism.



User concerns are legitimate. Employees may feel unable to learn the new system, be concerned that the criteria upon which job performance is measured may change for the worse, or find that somewhere down the road they may be unemployed (Wynn, 1982). Looking at change from this perspective, it appears that employees may not be "resisting" change, but rather are concerned with their own needs and goals. Needs and goals may well be as diverse as are the individuals themselves.

### Self-Concept

Individuals will differ in their acceptance of new technology. Because there are so many factors which may affect adaptation, self-concept may be another factor in acceptance of change. Not all employees will want to be re-trained for new job duties, but others will eagerly take advantage of this opportunity. The way in which individuals define their role at work may influence their behaviour on the job. For example: the eager, promotion-seeking individual may see automation as a way to do her/his job more quickly and more professionally. With the time left over the employee acquires new duties and responsibilities. For this individual, then, a great amount of self-worth may be placed within the job context, rather than outside of the job. For the individual who seeks pleasure and measures of self-worth outside the context of work (e.g., in the home,



sports etc.), less personal pride and commitment may be associated with the job, and changes may be viewed as being more bothersome than helpful. Individuals' perceptions of themselves, (e.g., how people describe themselves in a situation) may be a reflection of their self-concept. If one places little worth in their job, added responsibility may not only be disliked, but actively refused. The individual who perceives their job as a reflection of their personal esteem may view automation in a more positive light.

Quality of working life issues also stress the importance of acknowledging individual concerns in order to increase job satisfaction and motivation. Bair (1982) combines these two variables to predict four types of individuals found in any office, ranging from highly satisfied, motivated workers to dissatisfied, weakly motivated workers. Central to the concept of motivation is the "target" of derived gratification - whether it be the job or non-job related activities. Non-job related activities can be defined as leisure, sport and family activities.

Bair (1982, p. 6) cites a case study where a new automated office system was introduced unsuccessfully, which resulted in some individuals refusing to use the terminals. He concluded that these workers were deferring their energies to non-job related activities and therefore would have rejected any innovation which could improve their job. Job satisfaction was not important, as long as they were em-

ployed. Obviously, the ideal employee would be highly satisfied and highly motivated. Bair claims that with employee involvement in the implementation process and the assurance that health and safety concerns will be addressed, satisfaction and motivation will increase.

### **Purpose of Study**

The purpose of this thesis is to explore various alternative impacts of office automation on employees in two organizations. Office automation is changing organizations and these changes, in turn, are affecting the attitudes and feelings of those people who are part of the workplace. The focus of this thesis is on the employee perception of change.

Several factors have been cited in past research as critical variables in this expanding area of study. These include: the implementation process, degree of employee involvement, amount and type of training, changes in job content, stress factors, feelings of autonomy, changes in social interactions, environmental concerns and the individual's perception of the change. These variables were incorporated in a structured interview, which was the instrument employed to investigate change in the chosen office settings.

## CHAPTER II

### METHOD

#### Subjects

Participants were employees recruited from two organizations- Union Gas and Hewlett-Packard. On a voluntary basis, 23 computer users from Union Gas and 22 computer users from Hewlett Packard were interviewed. Both clerical (UG=13, HP=13) and managerial (UG=10, HP=9) employees were included in the sample. Employee years in the workforce, years of employment with each company and years in their present position are shown in Figure 1. Demographics of sex and age of employees are found in Figure 2 and Figure 3.

A prerequisite was working knowledge of the particular computer system and employment dating back to the pre-change situation. This prerequisite was somewhat modified for the Hewlett-Packard employees since they work in a computer company and have had access to computer technology since they joined the company. Nevertheless, continual innovation alters their work system and employees do encounter changing methods.

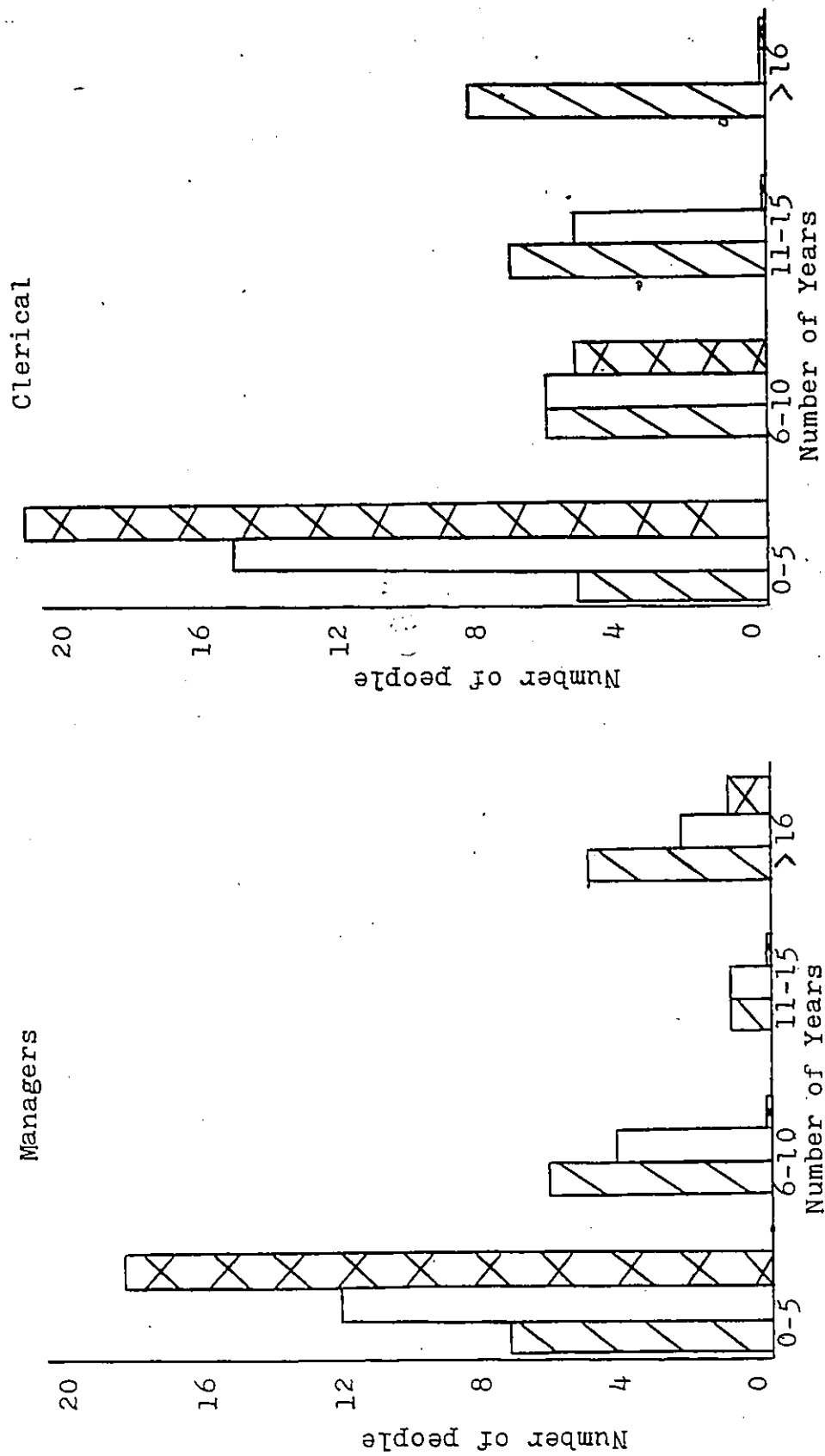





Figure 1. Employee years in workforce, company and present position.

 Years in workforce  
 Years with company  
 Years in present position

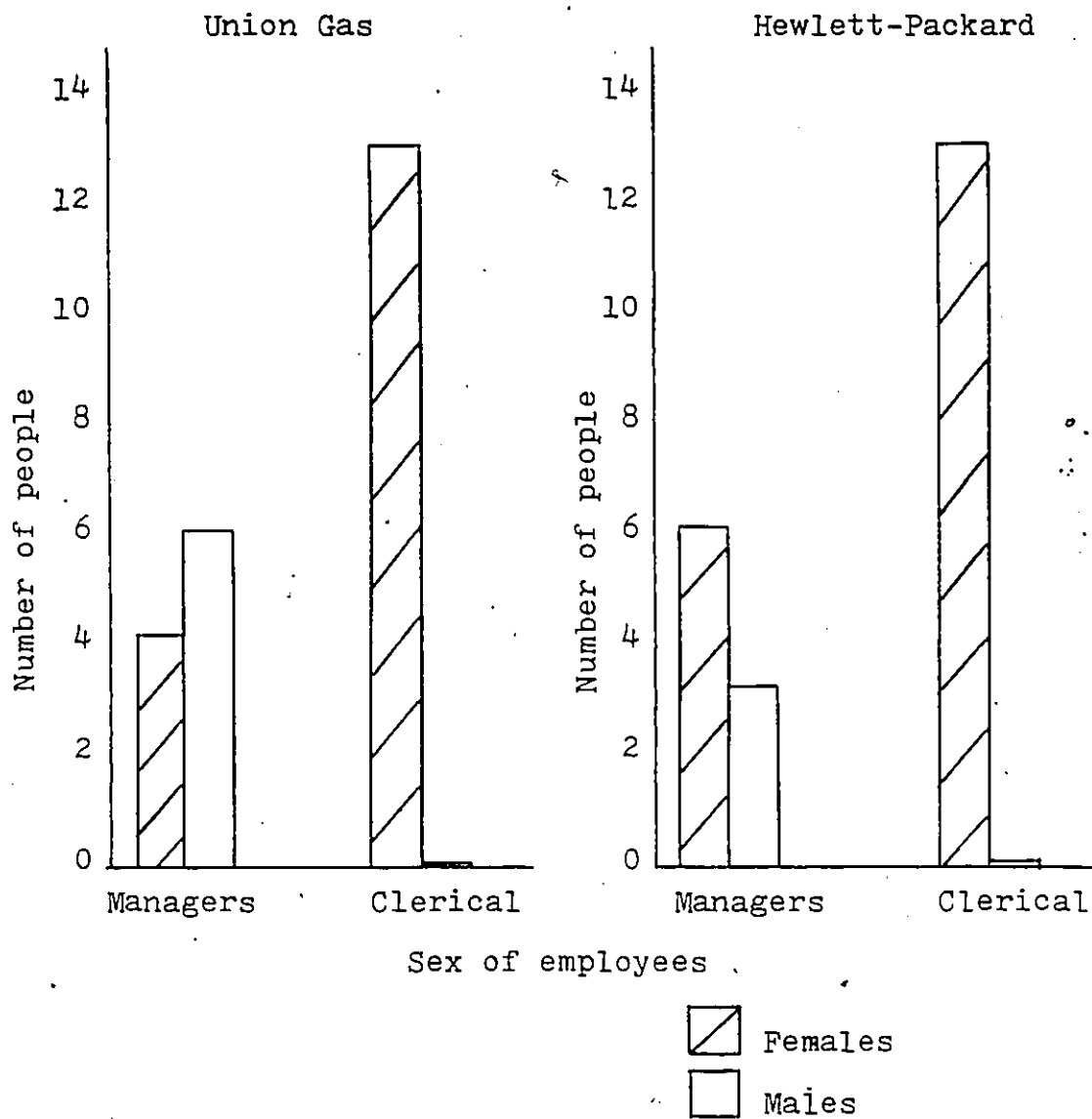


Figure 2. Frequency distribution of sex of employees within level by company.

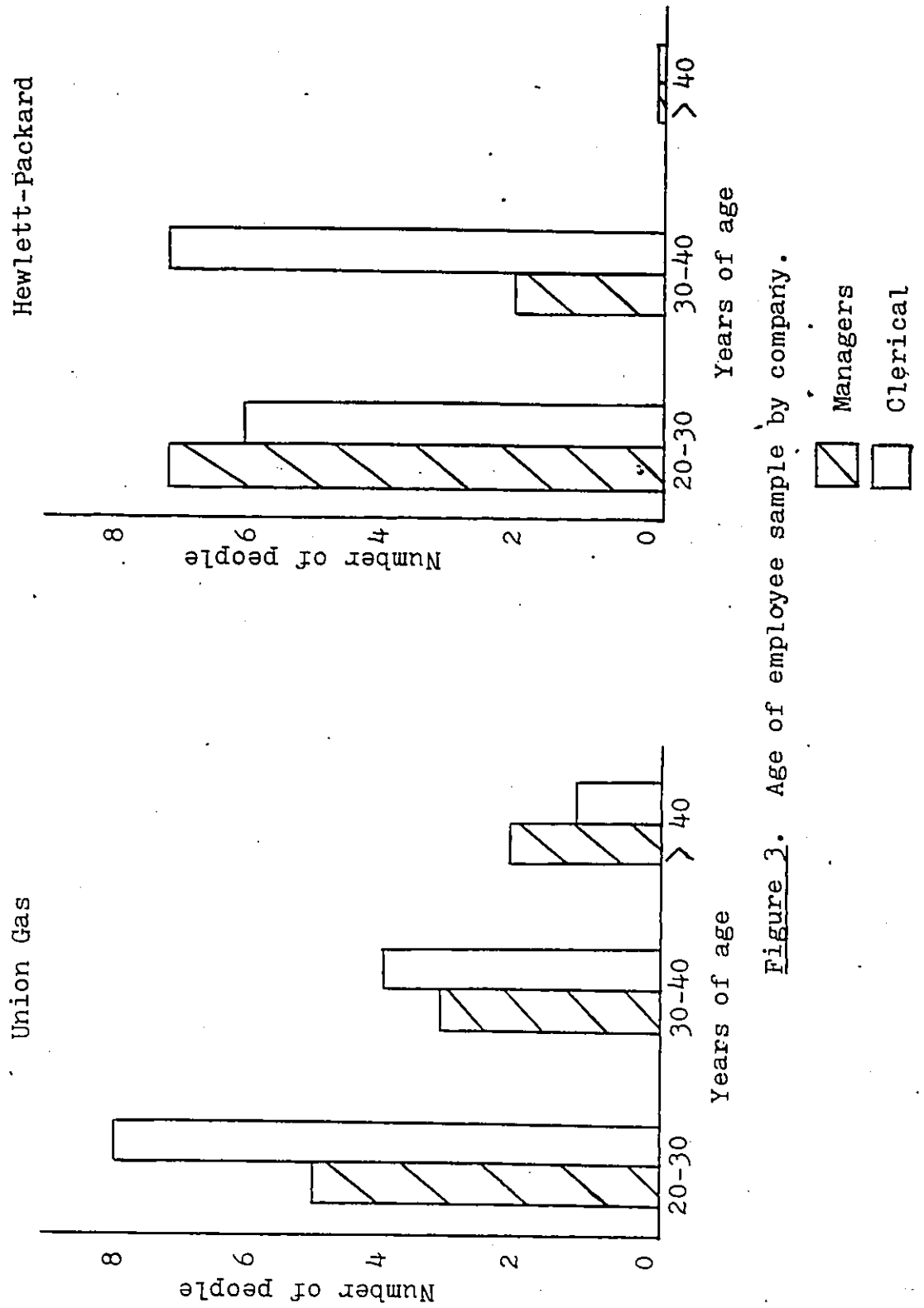


Figure 3. Age of employee sample by company.

### Companies

The Union Gas head office is located in Chatham, Ontario. They are a medium-sized gas utility serving Southern Ontario. Their computer history is as follows: introduction of the first computer in 1962 to use for customer billing. Slowly computers permeated other areas - personnel and payroll accounting, on-line customer service, materials management, personal computing and text and word processing. Managerial, clerical and technical specialists account for approximately sixty percent of the staff. The remaining proportion consists of service staff.

Hewlett-Packard is located in Novi, Michigan and is an area office of a multinational corporation. The product categories include computers and computer systems, testing and measuring instruments and medical electronic equipment to list several of many categories (more than 5,000 products in total). They emphasize innovation and research. The work force is composed of engineers, scientists and support staff. Service co-ordinators all have computer terminals on their desks for word processing and other daily functions. Typing is now computerized (word processing) as is servicing and registration of customer groups for demonstrations etc. These changes were implemented approximately one year ago.

Union Gas and Hewlett-Packard exemplify excellence with respect to their progressive company philosophies and atti-

tudes concerning employee input and involvement. They appear to place a great deal of value in their employees and the employees, in turn, recognize this commitment through job security and other job benefits. Employees in these organizations are typically well educated and work-oriented. They are interested in producing high quality, significant work and invest a great deal of pride in their jobs.

With both the companies and employees being progressive and goal-directed, a very positive scenario for company success and employee satisfaction should result. Employee satisfaction will be further explored in the results section.

In addition, none of the employees who were interviewed belonged to a union. Hewlett-Packard is not unionized. While some Union Gas employees do belong to a union, none of the respondents in this study were affiliated with a union.

### Procedure

Identifying user-based information concerning needs, attitudes and change is a complex task (Conrath, et al, 1982). Management scientists are concerned with job redesign, structural changes and overall organizational impact. The present research explored the change process from a psychological perspective, focusing on the individual level, where the end user is the specialist. To gain an understanding of the change process, individual job functions were explored. More importantly though, was the focus on



the individual's perception of the change, and attitudes and feelings which occurred as a result of the implementation of the computer system.

Worker attitudes in the two organizations were measured through the use of an open-ended interview. This individualized method allowed the researcher to establish greater rapport than might be expected through use of a questionnaire. Also, the employee was able to ask for additional explanation of questions during the interview, if necessary. Clarification and elaboration are additional advantages of the interview method (Isaac & Michael, 1971), permitting greater depth and allowing the researcher to probe for additional information. The personal interview is an excellent tool for gaining insight into the attitudes of personnel (Garon, 1981). Thus, issues concerning job role and satisfaction, quality of working life, changes in social relationships between people, and procedural changes and opinions were asked of each respondent. The interview procedure is time-consuming for both persons, but the wealth of information gained via this procedure validates its applicability in this research situation.

A structured interview was developed which consisted of open-ended questions based upon recent literature and research in the general area of office automation. A wide range of topics were explored in the interview process, focusing upon employee's past recollections and present per-

ceptions of changes which have occurred in their work and workplace.

Interviews were scheduled for forty five minute periods, in both organizational settings. Interviews were tape recorded after permission was obtained from the employee, with assurance from the researcher that tapes would be transcribed and then erased. Interviews were recorded in order to maintain the flow of the interview in progress. Writing may have allowed the researcher to inadvertently be selective in the kinds and amount of information she recorded; thus, introducing bias.

Following the completion of the interview, employees were thanked for their time and effort and were told a copy of the results would be available for their perusal upon completion of the study.

The interview (See Appendix A) consisted of 70 questions which focused on the following areas:

1. Perceptions/recollections preceding the implementation of computer technology
2. The implementation process
3. Subsequent changes in work/job practices
4. Importance of work to the individual
5. Influences on future promotional avenues and social relationships
6. Subsequent change to the work environment

7. Thoughts pertaining to future influence of computer technology.

To assist the reader, future references to specific questions from the interview found in the text, will be given in parentheses (e.g., (2) will refer to question 2 in Appendix A).

#### **Analysis/Data Reduction Procedures.**

Interpretation of the interview transcripts involved a great deal of information reduction, since over 5,000 individual responses (e.g., separately coded ideas) were obtained from the 45 interviewees. The procedure employed was the following:

1. Individual Employee Analysis: For each employee's transcript, separate ideas were coded individually for every question. This resulted in varying numbers of cards per question for the individual involved. Cards were coded by an assigned employee number (1-45), question number (1-70) and level (clerical or managerial).
2. Across Employees for each question: All cards coded to individual questions were separated and then sorted into categories which were based upon similarity in response content (e.g., involvement). These large categories were subdivided into more specific groups (e.g., involved vs. not involved). Response categories with similar meaning were clustered together

which resulted in each question having approximately 1-20 content areas. Finally, content areas across questions were generated to further reduce the data.

3. Across questions: Quantitative data (e.g., yes/no responses) were coded separately for each question per employee for computer analysis. Pearson product-moment correlations were calculated for each variable (responses to each question became separate variables) over the entire sample. Also, chi-square analyses were conducted using these data. Employees were grouped according to level (managerial or clerical) and company (Hewlett-Packard or Union Gas), resulting in separate chi-square analyses.

Qualitative data were categorized according to post hoc theoretically determined categories. The structured interview elicited thousands of responses from the 45 employees. Responses were clustered into eight categories and 18 subcategories which are shown in Table 1.

The forementioned categories and subcategories provided a framework for the discussion of the results obtained from the interviews. In this way an attempt was made to view the change process from a sequential perspective: beginning with the employees' introduction to the new technology, leading into the change itself and the subsequent changes to the office setting, and finally envisioning what may lie ahead in the future.

TABLE 1

## Categories utilized in results

## Company philosophy and policies

- Job security
- Opportunities for advancement
- Teamwork
- Input into organizational decisions

## Self-Concept

## Prior Expectations

- Introduction to computers
- Employee memories of anticipations

## The Implementation Process

- Initial system choice and design
- Implementation process
  - Installation
  - Initial training
  - Ongoing training
  - Methods of ongoing training

## Past and Present Work Practices

- Changes in job

## Individual job satisfaction

- Factors which may result in decreased satisfaction
- Factors which may result in increased satisfaction

## Adaptation to Change in the Work Environment

- Performance of the technology
- Structural changes in the office environment

## Future Influences and Concerns

- Influence on individual's job
- Office of the future

## CHAPTER III

### RESULTS

The analysis of employee interviews resulted in the formulation of the categories presented in this chapter. The company philosophies and policies were explored, followed by a summary of specific characteristics of the respondents from these companies. The focus was then directed toward changes in jobs as a result of automation and subsequent employee satisfaction. Further changes to the surrounding office environment were examined. Finally, concerns and predictions for future technological change were considered.

#### Company Philosophy and Policies

##### Job Security

Union Gas and Hewlett Packard are companies whose philosophies or policies provide employees with high levels of confidence concerning job security, thus, employees expect job security in return for their loyalty. It is evident that these employees are involved in their jobs and expect job security in return. With reference to the possibility of losing their job as a result of automation, of all 45 respondents, 22% do not anticipate a loss in jobs directly.

Twenty five percent of those interviewed did consider the possibility of the technology phasing out jobs in the future but, generally, job loss does not appear to be a major concern for these employees. Over one half (53%) of the respondents did not make any comments at all concerning a potential decrease in jobs (49) at any time throughout the interview. Thus, it was evident that employees were aware of company policy on this issue.\* This was emphasized by the following reports:

	Percent Mentioning (of all 45 respondents)
.company would retrain or transfer me, would not fire me	100%
.company does not lay off, fire or overhire	64%

Obviously, employees are very secure with this knowledge and therefore would have few concerns that their jobs would be in jeopardy as a result of the automating process.

#### Opportunities for Advancement

Opportunities for advancement from within is another key point in company philosophy. Employees were asked (58) to consider how, if at all, computers had affected their status in the organization. It appears that the impact of the technology has had a limited effect on perceived change in status, with more than half of the interviewees (58%) re-

porting no change. Status changes which were thought to have occurred because of automation (59) included:

Percent Mentioning  
(of 27 responses)

.increased credibility and visibility	
as a result of automation	15%
.upgraded job titles and functions	26%
.increased opportunity on the job	26%

Although these comments may be interpreted as improving promotional avenues, it is apparent that they are not representative of all respondents. Almost all (98%) are interested in promotion (60), yet computers are perceived as influencing these aspirations by only 56% of those interviewed. The technology itself, therefore, may not be the only factor needed to obtain promotions. Other factors obviously play important roles when considering promotional avenues and success. Company policies or procedures may be very important in this promotional process.

### Teamwork

A third key point to company philosophy is encouragement of teamwork among employees. The very need to work with more people to carry out one's own job (as a result of automation), may lead to increased opportunity for teamwork and cooperation. And indeed the increase in teamwork due to automation was quite dramatic (See Figure 4).



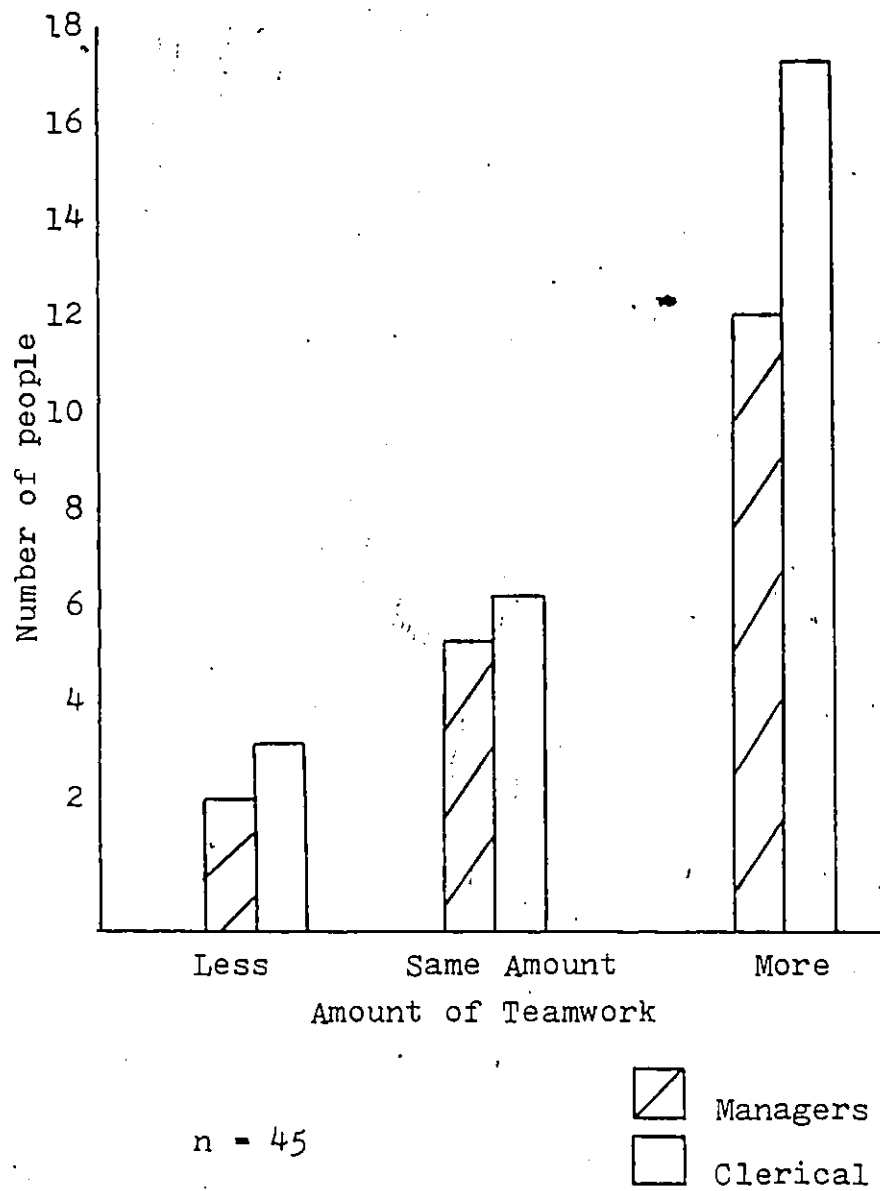


Figure 4. Teamwork on the job.

Almost two thirds of the employees (64%) felt this was what had occurred. Reasons given (53) for the existence of teamwork included:

Percent Mentioning  
(of 18 responses)

.mutual benefit - sharing of ideas and information, solving problems together	28%
.we help each other out	28%
.teamwork is encouraged on the job	17%

The fact that teamwork is encouraged by company philosophy may be the key to the huge jump in teamwork. Thus, it may be that change can be partially attributed to automation but may also be influenced by company procedures.

Input into organizational decisions

A fourth point in company philosophy is input into organizational decisions. That this aspect of philosophy is realized in practice is evidenced by statements such as:

Percent Mentioning  
(of 46 responses)

.I am asked for my opinion sometimes	41%
.my boss/department depends on me for information and input	15%
.is a participative management style and I have a lot of say	17%

While only a few suggest that participation has not been fully realized, stating:

Percent Mentioning  
(of 46 responses)

.never had any say, nor do I now	15%
.managers make the decisions	11%

Automation evidently has had little effect on participation in decisions, since over half (56%) of interviewees mention that the extent of involvement or input into organizational decisions has not changed as a result of the automating process. As can be clearly seen from Figure 5, however, automation has most certainly not decreased employees' input into decisions. If anything, participation has been slightly increased, especially among managerial personnel.

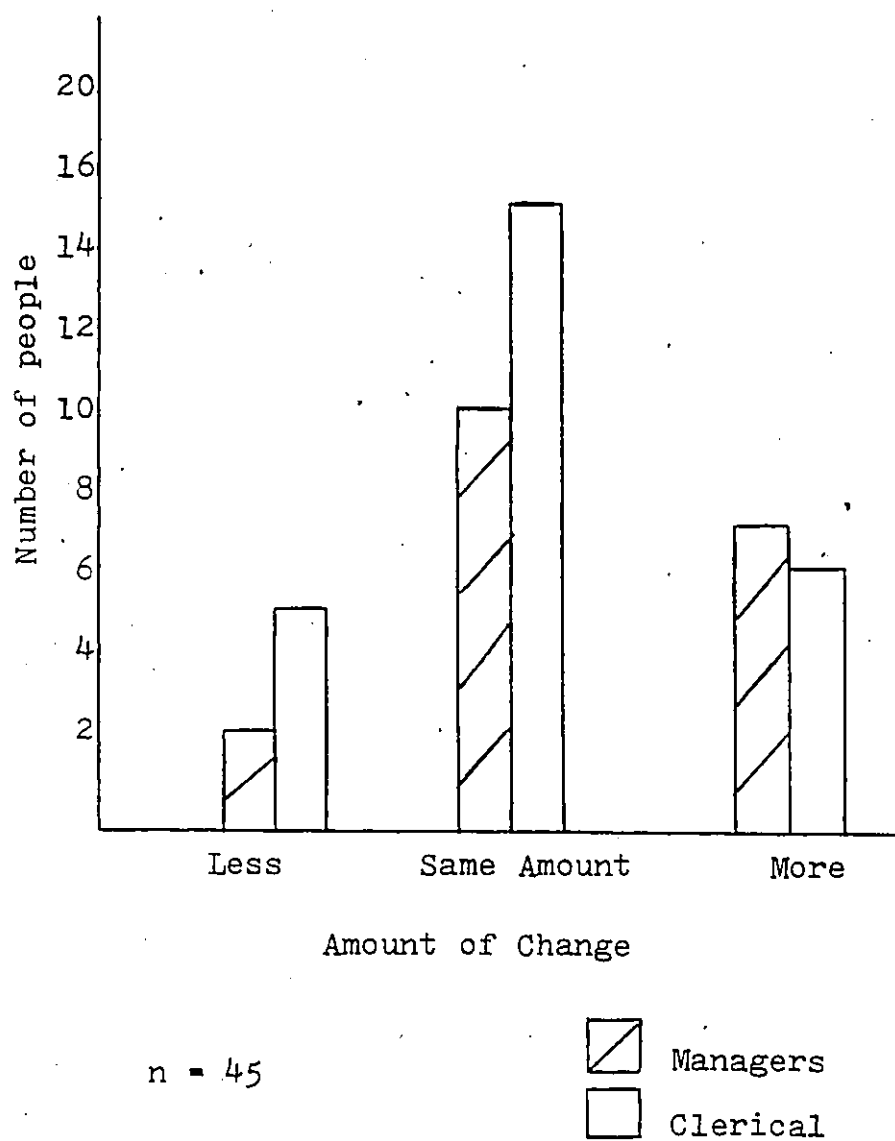


Figure 5. Input into organizational decisions.

### Self Concept

Interviewees were asked questions exploring whether they placed greater emphasis on work-related or external sources. Close to three quarters (71%) of the interviewees perceived themselves as work-oriented individuals who are:

	Percent Mentioning (of all 45 respondents)
.seeking growth and advancement	89%
.working because of financial concerns	11%
.increasing their knowledge from their job	7%

It was very interesting that one third of those interviewed indicated a need for additional education. They felt more education would be beneficial, even though almost two thirds (64%) of the group have post secondary degrees (See Figure 6).

It is likely they are referring to more specialized computer training rather than additional degrees. The manner by which individuals define their role at work and outside of the workplace, may be a factor which influences their behaviour on the job. Interviewees were asked "who are you?" (63) and quiled to respond in terms of work vs. outside self descriptions.

In what activities does the individual find gratification? Employees felt that their work was meaningful and im-

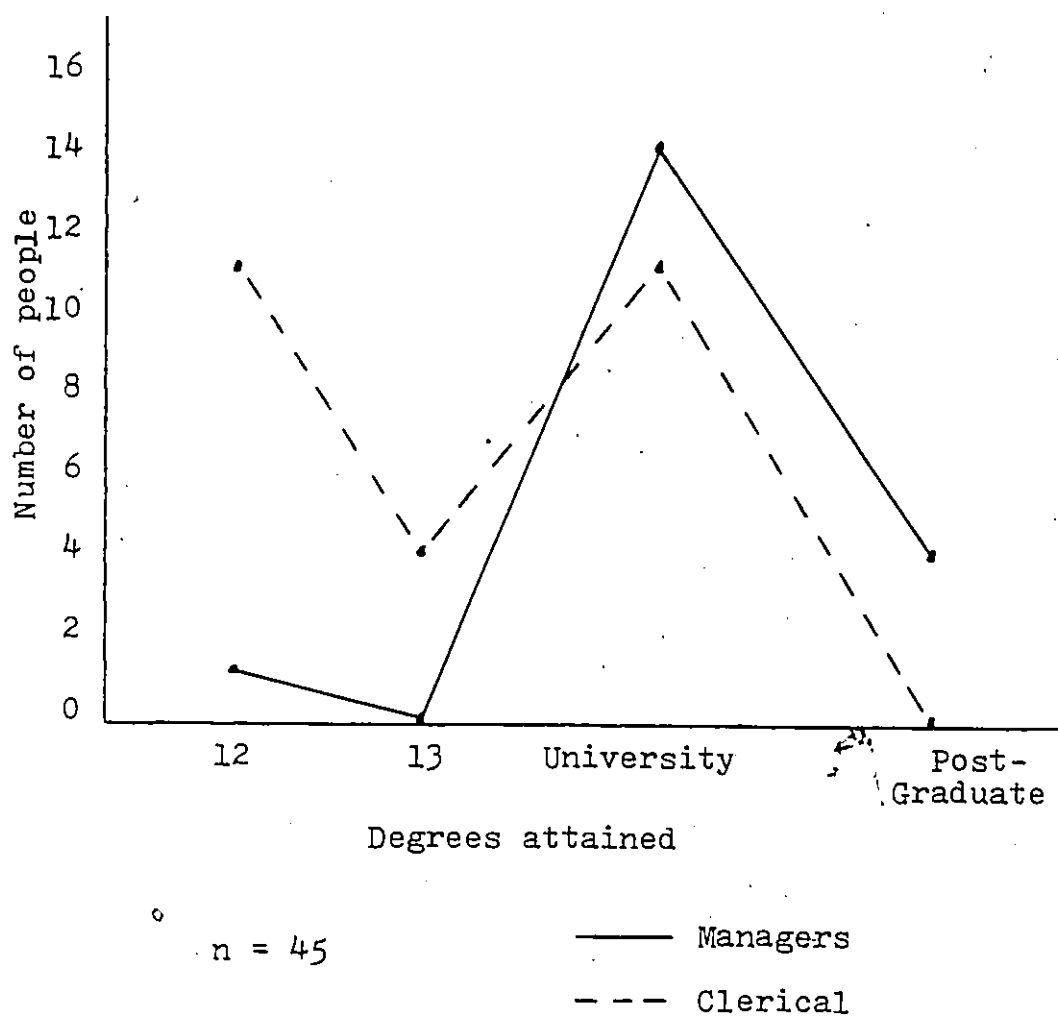


Figure 6. Number of years of education.

portant (98%) and felt it was imperative that their job was one in which they were able to produce something they perceived to be important and significant (65,66). Employees were asked (63) to describe themselves and to choose a stated role identification: with work, home, or some other affiliation. Employees appear to describe themselves as home-oriented to a large degree. Substantial differences are found when managers are compared to clerical employees using responses given to question (63):

	Percent Mentioning (of all 45 respondents)	
	Mgrs	Cler
.Identification with work	47%	27%
.Identification with home (not outside interests in total)	22%	46%

Moreover, when managerial responses in the 'home' category are divided by sex, an interesting split occurs (10% of females, 33% of males responded in this way). Forty percent of the female managers did not answer this question, while only 11% of male managers did not respond. This difference in response rate may have occurred for several reasons. Perhaps the female managers see their jobs differently than do male managerial employees. Fewer females chose the "home" reference than males, which may suggest they place more importance in their job because they are rejecting the traditional expectation of the woman in the home.

Rather than giving a "right or wrong" answer, they may have declined to answer in order to remain neutral. Males, on the other hand, were not afraid to describe themselves as home-oriented, since the accepted norm is the working male.

Obviously, there was some reason why so many females declined to answer this question, and when they did so, chose work over outside or home interests. Thus, female managers appear more work-oriented than male managers, though the reason for this difference remains uncertain.

When requested to choose between "work" and a more general "outside interest" category (64), in which to frame their response, the majority in both levels (62%) chose outside interest (Mqr=63%, Cl=58%). Nevertheless, all employees place a great deal of emphasis on being able to learn and increase their knowledge while on the job. In addition, they take pride in the fact that they are significantly contributing to the company and view their role as an important one in the larger frame of reference surrounding the company as a whole.

#### Prior Expectations

In order to obtain an overall picture of what employees thought when the new technology was introduced, they were asked to look back to the period before automation and review what they thought was going to happen and what they perceived as actually happening. They were asked to report



1) how they were introduced to computers, and 2) what their memories were of what they thought was going to happen.

### Introduction to Computers

How did people come by their expectations of what would happen? When asked (7) how they became acquainted with computers, people mentioned the following:

	Percent Mentioning (of 32 responses)
.Sources given	
.school settings	25%
.previous jobs	13%
.previous computer courses	13%
.magazines and articles	3%
.Indicated no acquaintance	
.little knowledge/lacked understanding	38%
.No mention	8%
	----
	100%

Therefore, approximately fifty percent of the interviewees were previously acquainted with technological equipment and software and half had no or little prior introduction to computers. Those with little knowledge, who mentioned a lack of understanding of both functioning and ability of these machines, may have had reason to be somewhat apprehensive of the changes. This may also have been true for those who did not mention prior contact with compu-

ter technology. Evidently, it was possible that some people had been afraid of the new technology. When asked (9), over three quarters (78%) of interviewees agreed that people had been somewhat apprehensive. Their apprehensive feelings stemmed from two main sources:

	Percent Mentioning (of 56 responses)
.fear of unknown	41%
.lack of technological understanding	21%

### Employee memories of anticipations

Given people's apprehensions it seemed likely that they would expect the new technology to have a marked impact on their jobs. When asked (8) whether they had thought computers would affect their work to some degree over four fifths (82%) said that they had thought their work would be affected (See Table 2).

Surprisingly, despite their apprehensions, almost all the ways which people had expected computers to affect their work were positive. In fact, when specifically asked (10) whether or not they had thought computers would make the job better, 91% said they would. Thus, although people seem to have approached the impending change with some degree of apprehension there was nevertheless a general expectation that their jobs would be better as a result. What actually happened?

TABLE 2

## Specific ways work would be affected

	Percent Mentioning (of 61 responses)	
.improved job efficiency	34%	
.make work easier (n=6)		10%
.speed work up, time saving (n=6)		10%
.avoid repetitive, mundane tasks (n=4)		7%
.increase productivity (n=4)		7%
.job-related assistance	18%	
.will be beneficial to job (n=4)		7%
.will ease up workload (n=3)		5%
.useful aid, tool (n=3)		5%
.enormous capabilities available (n=2)		3%
.no idea	20%	
.hadn't thought about it (n=9)		15%
.didn't think I'd be using computers (n=3)		5%

**The Implementation Process**

In attempting to construct a picture of this process from beginning to end, employees were asked to consider whether or not they had been involved at two points in time: 1) initial system choice and design, and 2) system implementation.

**Initial System Choice and Design**

The system choice and design process involved determining which computer system or package would best suit the needs of the company both for present and future expansion. Choice refers to the preferred capabilities of the technology and design to more basic employee needs (e.g., will the computer be beneficial on the job)?

Involvement or lack of involvement in these processes varies according to individual preferences. Given the presumed participative management style, it may seem somewhat surprising that many interviewees (73%) responded that they in fact had not been involved. Those employees (27%) who were involved in system choice and design (12) mentioned that they either had been asked for their input or opinion or had made the decision themselves. It appears that some of these latter may have preferred even greater involvement according to these expressed statements:

	Percent Mentioning (of 34 responses)
.had limited involvement	18%
.would have preferred to have been more involved	18%

It becomes much less surprising that so many people were not involved when we see that more than half of the respondents (60%) specifically stated that they had no interest in earlier involvement (13). Why were they not interested in being more involved in the process? Generally, individuals mentioned two concerns:

	Percent Mentioning (of 34 responses)
.lack of technical knowledge	24%
.lack of system understanding	9%

The remaining forty percent indicated that they would have liked to have been involved earlier in the process because:

	Percent Mentioning (of 19 responses)
.involvement leads to better understanding of the technology	11%
.increases feeling of control	21%
.allows for a higher profile in the company	5%
.management should ask for input from employees	37%
.would like to be involved	26%
	-----
	100%

The number of managerial employees involved in system choice and design (n=10) were approximately equal to those not involved (n=9). Clerical employees were far less evenly balanced ( $\chi^2(1) = 10.84$ ,  $p < .05$ ). Thus, only two clerical people (8%) were involved, while 24 (92%) were not.

While the number of managerial employees actually involved corresponds fairly closely with the number who wanted to be involved, 50% vs. 44%, the number of clerical staff actually involved was a good deal less than the number who wanted to be involved, 8% vs. 36%. Thus, while in general actual and desired amount of participation or involvement in system choice and design were in good balance, there was more lack of balance among clerical staff.

## **System Implementation**

### **Installation.**

Installation referred to actual decision making concerning when and where the computers would be installed or the training of employees on the chosen computer system.

Employees were questioned (14) as to the amount of their involvement in system implementation (See Figure 7 for system implementation dates which reflect the ongoing aspect of change as a result of automation as perceived by employees).

Managerial and clerical levels differed in the degree to which they were involved in the installation phase of the implementation process  $\chi^2 (1) = 9.53, p < .05$ . Over half of the managers, (53%), but only a few clerical staff (8%) participated. Those who felt they had been involved in the implementation of the system (40% of total respondents), mentioned two types of involvement (See Table 3).

### **Initial Training.**

This section refers to the training received by employees immediately following the installation of the new technology. Interestingly, the split between levels once again was substantial. Sixty seven percent of the managerial staff were involved, while only 20% of the clerical employees responded in this way. Likely the clerical staff who had not been involved in the implementation (80%) were those

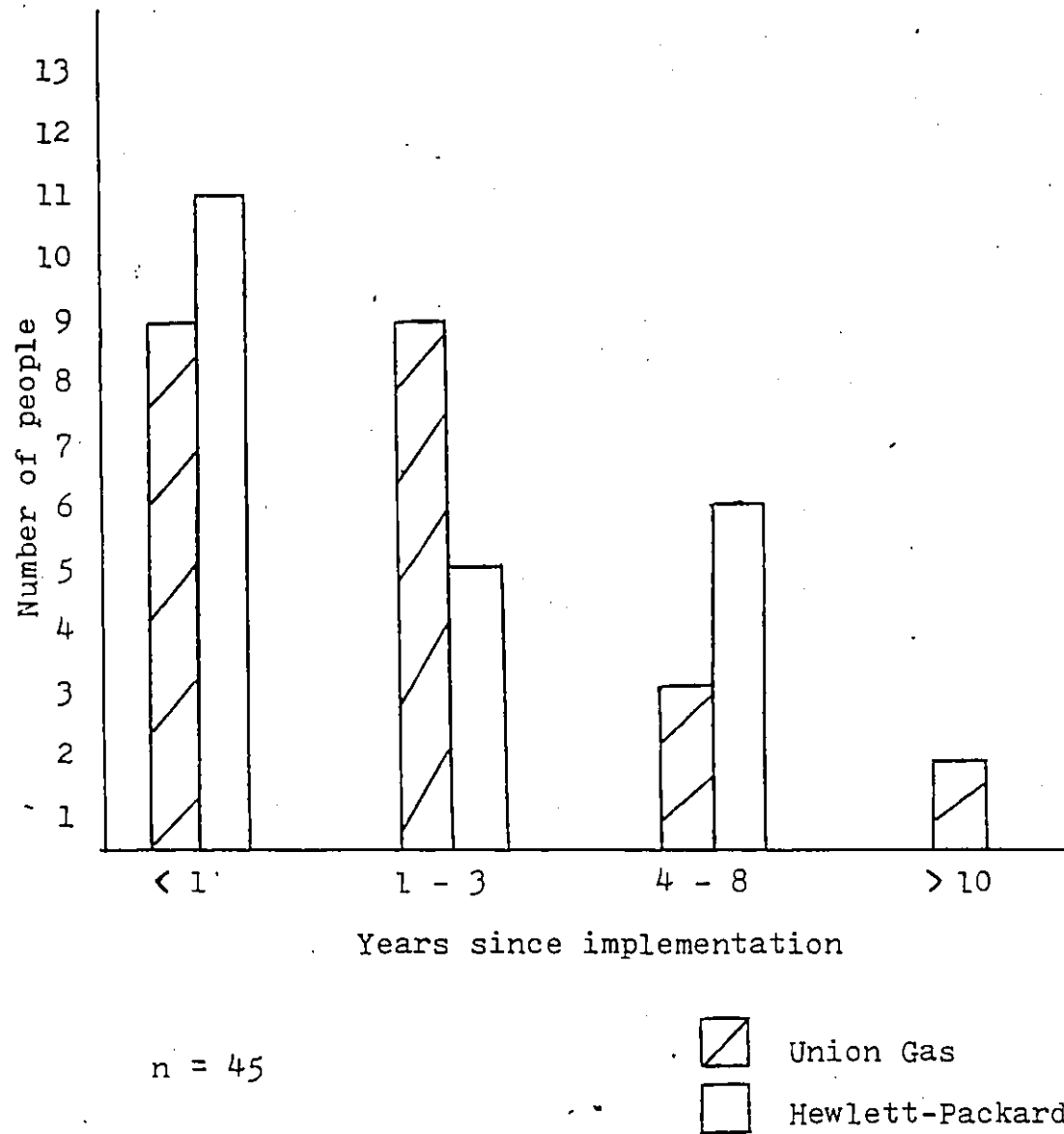


Figure 7. Date of implementation of technology.

TABLE 3

## Types of Involvement in Implementation

	Percent Mentioning (of 37 responses)
.direct decision making during installation	43%
.the training process	46%

who participated solely through training received after the technology was installed.

The majority (60%) stated they had not been involved but:

	Percent Mentioning (of 37 responses)
.had received training	38%
.were not involved, their boss had been involved	11%

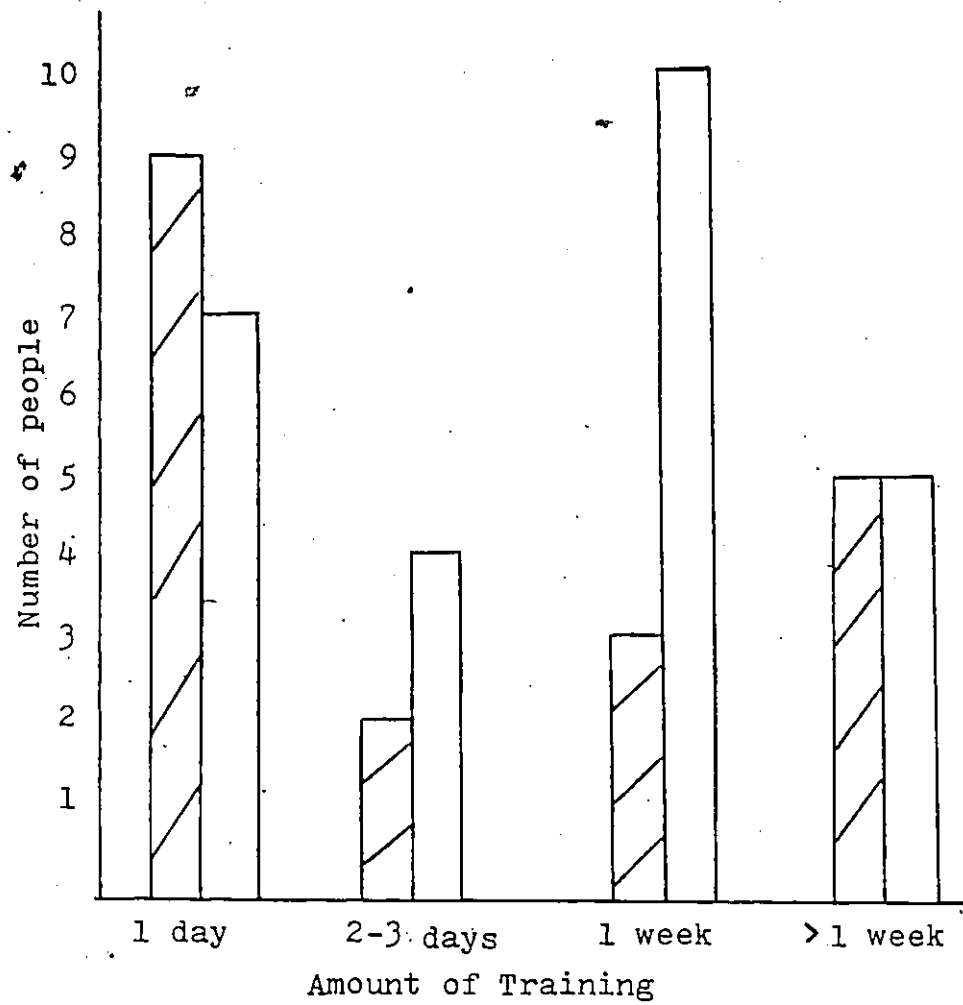
Apparently, many employees were involved in the implementation process solely through their training courses after the technology was installed (See Figure 8).

Rather than viewing this implementation as a one shot process, many of those interviewed stressed the ongoing aspect of both implementation and training.

#### Ongoing Training.

The addition of computer hardware and software and extensions to the present system was seen as a continuing pro-





n = 45



 Managers  
 Clerical

Figure 8. Employee training periods.

cess by 75% of all respondents. This constant change would necessitate an ongoing training program. Ninety three percent of this group agreed that adequate training (19) was provided (See Table 4).

TABLE 4

Ways in which ongoing training occurred

	Percent Mentioning (of 22 responses)
.monthly meetings	9%
.advanced training classes	36%
.systems people provide information	23%

The training aspect of the implementation process was thought to be of utmost importance by most of the interviewees. A general consensus of agreement was found when asked if they had received adequate training (19). Seventy eight percent felt that they had been properly trained, while only 23% indicated that more training would have been preferable. When asked (25) whether they had adapted to the system, fully 100% agreed they had. It was also indicated that people in general (24) had adapted (100%) very quickly to the technological changes.

**Methods of Ongoing Training.**

As a result of the many ongoing changes which occur in these offices on a frequent basis, employees must be kept up-to-date (21) in some way. Almost all (93%) felt that

they were being informed of upcoming changes. Some of the ways in which they were being kept informed are shown in Table 5.

TABLE 5  
Information Sources

	Percent Mentioning (of 38 responses)
.memos	27%
.monthly meetings	18%
.updates to the manual	18%
.information from training personnel	13%
.newsletters	11%
.from supervisors or company	8%
.word of mouth	5%
	-----
	100%

### Past and Present Work Practices

#### Changes in job

Now that the system has been implemented two thirds of the interviewees work on computer terminals (26) for more than 20% of their work day. Differences in amount of daily use (time) of the computer terminal are shown in Figure 9.

As shown, clerical employees utilize the terminals far more frequently in their daily work endeavors than do managers  $\chi^2(1) = 10.01, p < .05$ , based on a split at 20% daily use. How did people perceive the change in their jobs? Changes which have occurred in jobs are shown in Table 6.

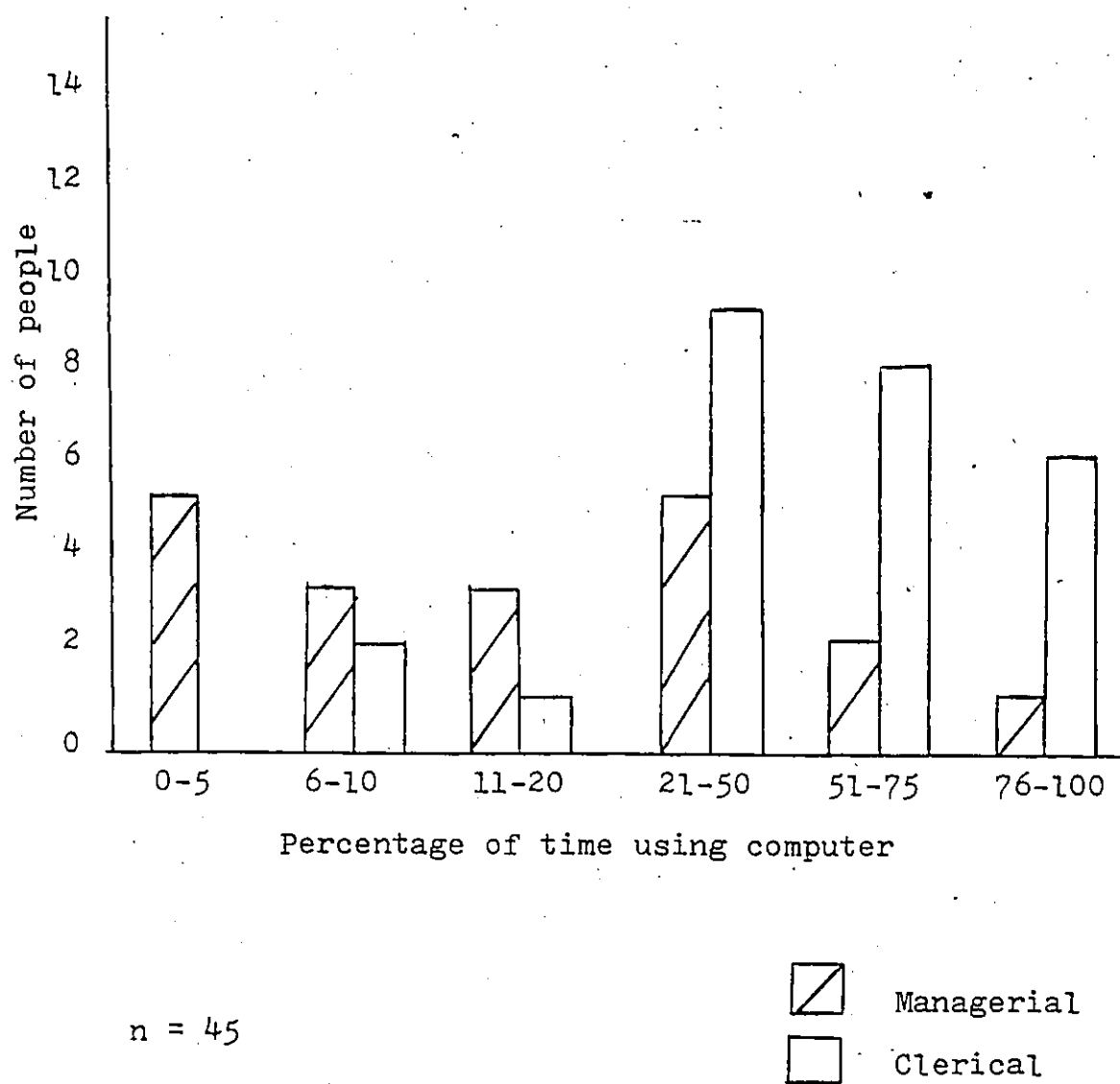


Figure 9. Daily use of computer terminal.

TABLE 6

## Employee perception of changes in jobs

	Percent Mentioning (of all 45 respondents)		
	Mgrs	Cler	Total
.stress has increased, deadlines to meet	79%	62%	69%
.work is more demanding	72%	50%	59%
.work has increased	74%	69%	71%
.their job is easier	61%	65%	64%
.work is more quickly done	72%	88%	82%
.quality is better	100%	96%	98%
.more responsibility and variety is allowed	89%	64%	75%
.work is more interesting	78%	73%	76%
.work is more challenging and exciting	84%	88%	86%

While their present jobs are thought to be more demanding, with more work to process on a daily basis, employees maintain that this added work and effort is worthwhile and rewarding. Despite the increased amount of work resulting from automation, the large majority (91%), stated that they preferred automated work over manual or past work methods (32). Work presently was thought to be easier, faster and more interesting and challenging. Added responsibility and job variety was also found. Increased responsibility, therefore, was thought to be a positive rather than a negative outcome.

Interestingly, when asked to rate the amount of stress they experienced on the job (44), most reported somewhat av-

erage rather than elevated ratings of stress (See Figure 10).

When questioned further, employees reported increased stress but surprisingly this stress did not appear to have a negative effect. In fact, just the opposite appears to be true. Stress, therefore, may be increased mainly because of additional deadlines and time constraints which are uniquely tied to both the system and the expectations that it will make work more efficient and timely. While stress has increased, it obviously is not a deterrent to employee output or job satisfaction.

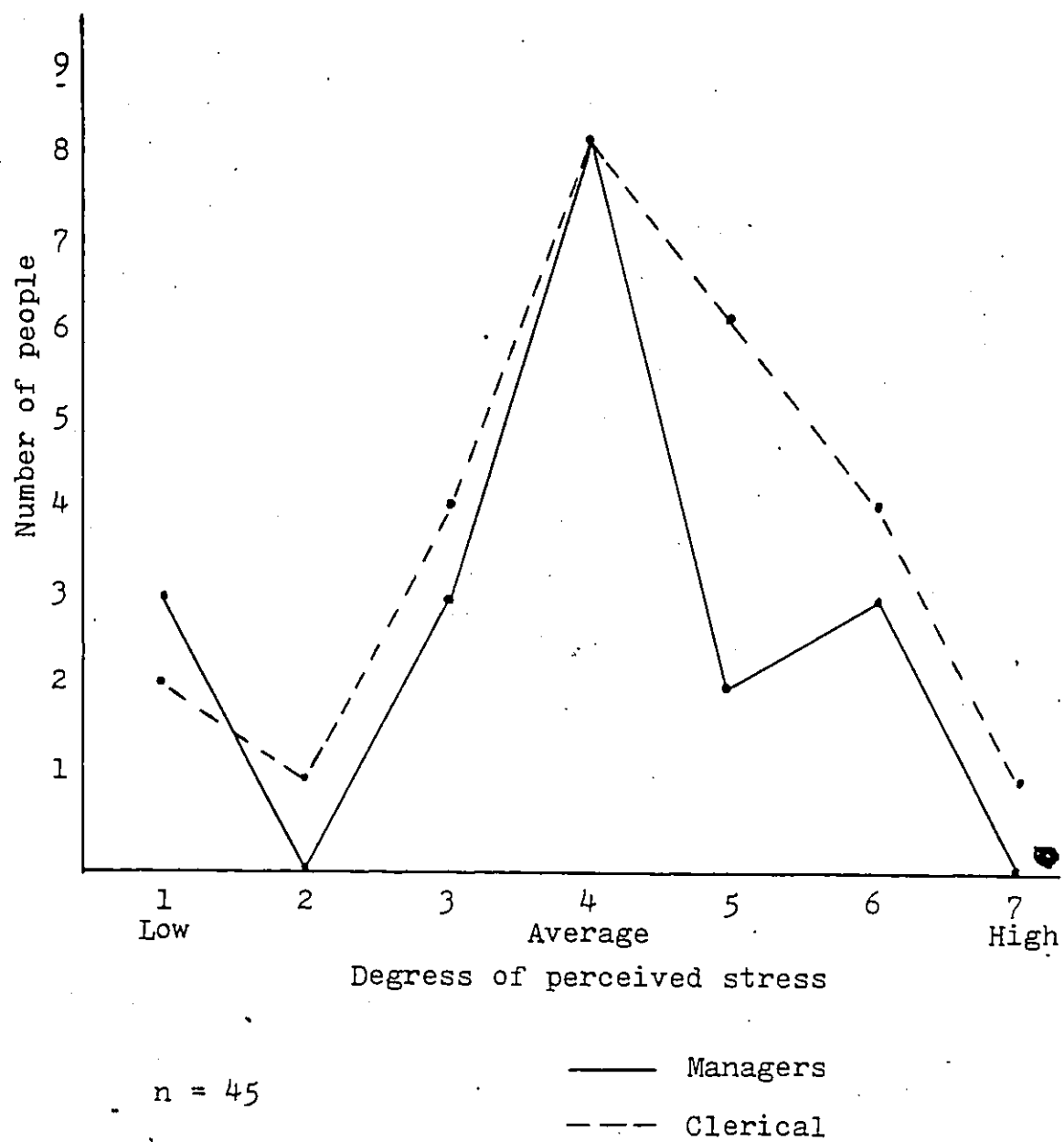


Figure 10. Employee ratings of stress on the job.

### **Individual Job Satisfaction**

Employees did in fact generally express an elevated level of job satisfaction now as compared to before automation (62). Responses on a seven point scale were extraordinarily high, falling in the five to seven point range as shown in Figure 11.

Moreover, no significant differences were found between managerial and clerical personnel  $\chi^2(5) = 9.56, p > .08$ , although evidently a few clerical staff (but none of the managers) were less satisfied after the change.

Many factors were thought to have had an impact on job satisfaction of the respondents. Among specific factors traditionally related to job satisfaction those most often mentioned include: the reward system, job improvements, self monitoring, and initiative and freedom on the job. These topics generated substantial input from employees, as shown in Table 7.



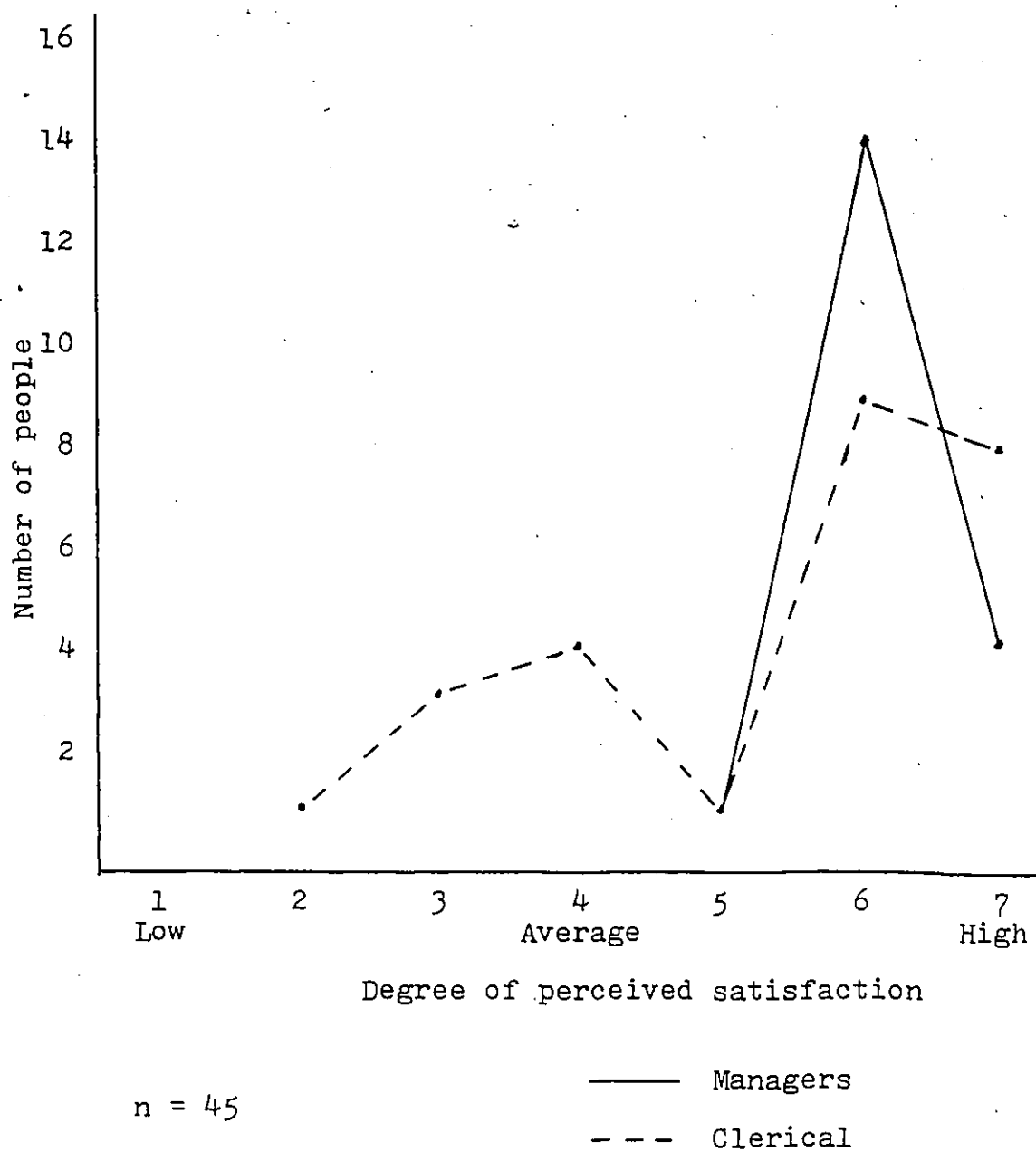


Figure 11. Employee ratings of job satisfaction now as compared to before automation.

TABLE 7

## Factors influencing Job Satisfaction

	Percent Mentioning (of 17 responses)
Poor/inadequate rewards	
.should be paid more money for more work (n=2)	12%
.position should be upgraded (n=3)	18%
.be given recognition, credit for work (n=4)	24%
.merit pay a good idea (n=1)	6%
.if have free time am given more work (n=2)	12%
.computers eliminate social contacts (n=1)	6%
Better job	(of 27 responses)
.enjoy job, am learning new methods (n=6)	22%
.more variety in job, more interesting (n=4)	15%
.added challenge to job (n=2)	7%
.more responsibility and control on job (n=2)	7%
.understand more now (n=1)	4%
Monitoring	(of 28 responses)
.never have been monitored (n=9)	32%
.don't see a need to be monitored (n=4)	14%
	Percent Mentioning
productive monitoring:	22% of all 45 respondents (of 28 responses)
.function of machinery - e.g., counting errors etc. (n=4)	14%
.during the early stages was more obvious (n=2)	7%

Table 7 (cont'd)

increased initiative:	89% of all 45 respondents (of 22 responses)	
.creativity and learning is enhanced	50%	
(n=11)		
.changed job duties/responsibilities	18%	
(n=4)		
.there is now time to experiment and use your own ideas (n=2)	9%	
increased freedom:	80% of all 45 respondents (of 26 responses)	
.time saver, frees up time for more creative project (n=5)	19%	
.eliminates mundane tasks (n=3)	12%	
.more responsibility as knowledge increased (n=5)	19%	
.expanded, enhanced my job (n=3)	12%	
Less social interaction	(of 36 responses)	
.less people contact (n=9)	25%	
.less opportunity to socialize (n=3)	8%	
.people will resist any change to established interaction patterns (n=1)	3%	
More social interaction	(of 36 responses)	
.need to deal with more people in order to carry out your job (n=9)	25%	
.need to work with systems personnel to answer questions and problems (n=5)	14%	
.learning the content of other jobs (n=2)	6%	

#### **Factors which may result in decreased satisfaction**

Relatively few negative comments were given by employees. Those which were given, focused on adequacy of rewards (See Figure 12).

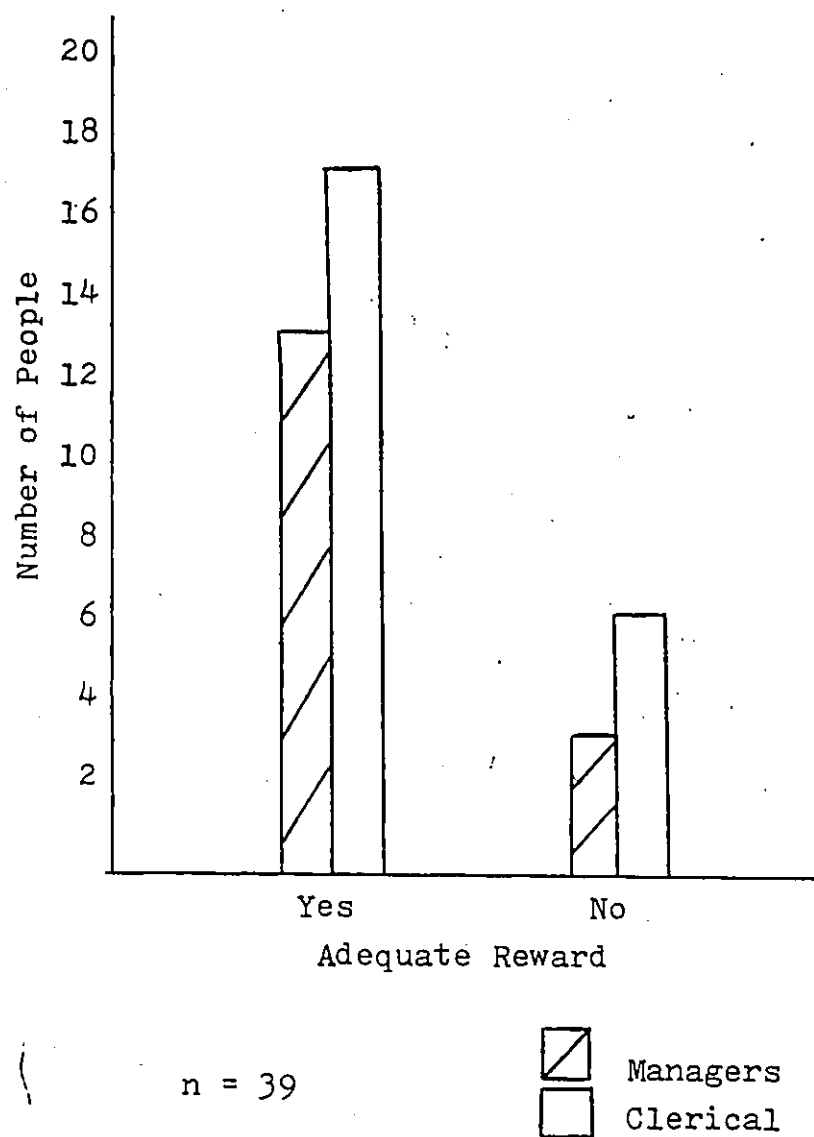


Figure 12. Employee satisfaction of adequacy of rewards.

Issues of concern were increased pay and recognition in return for better and increased work output. Another area of dissatisfaction was the fear that computer technology was eliminating social contact, as well as the freedom to socialize while on the job. Several individuals also predicted that some people will resist change, which is likely in any change situation.

#### **Factors which may result in increased satisfaction**

On the other hand, three quarters of those interviewed (75%) felt their job had become more interesting as a result of the change to automation. Employees felt that added variety and challenge in their jobs had improved the work. In contrast to the aforementioned negative feelings concerning social interactions, social contact was thought to have increased according to 64% of the interviewees. This additional contact appeared to be a result of both the need to be in touch with people for answers to questions, as well as for sharing of ideas and information through teamwork on the job. Table 8 verifies the fact that many individuals (47%) reported increases in both social contacts and teamwork as a result of automation.

Approximately half (49%) of the interviewees indicated that monitoring had remained the same as preautomation (See Figure 13).

Table 8

Obtained Frequencies for Teamwork and People/Social  
Involvement

		People/Social Involvement			
		no answer	less	more	Total
Teamwork	less	0	3	2	5
	same	3	2	6	11
	more	0	8	21	29
	Total	3	13	27	45

n = 45

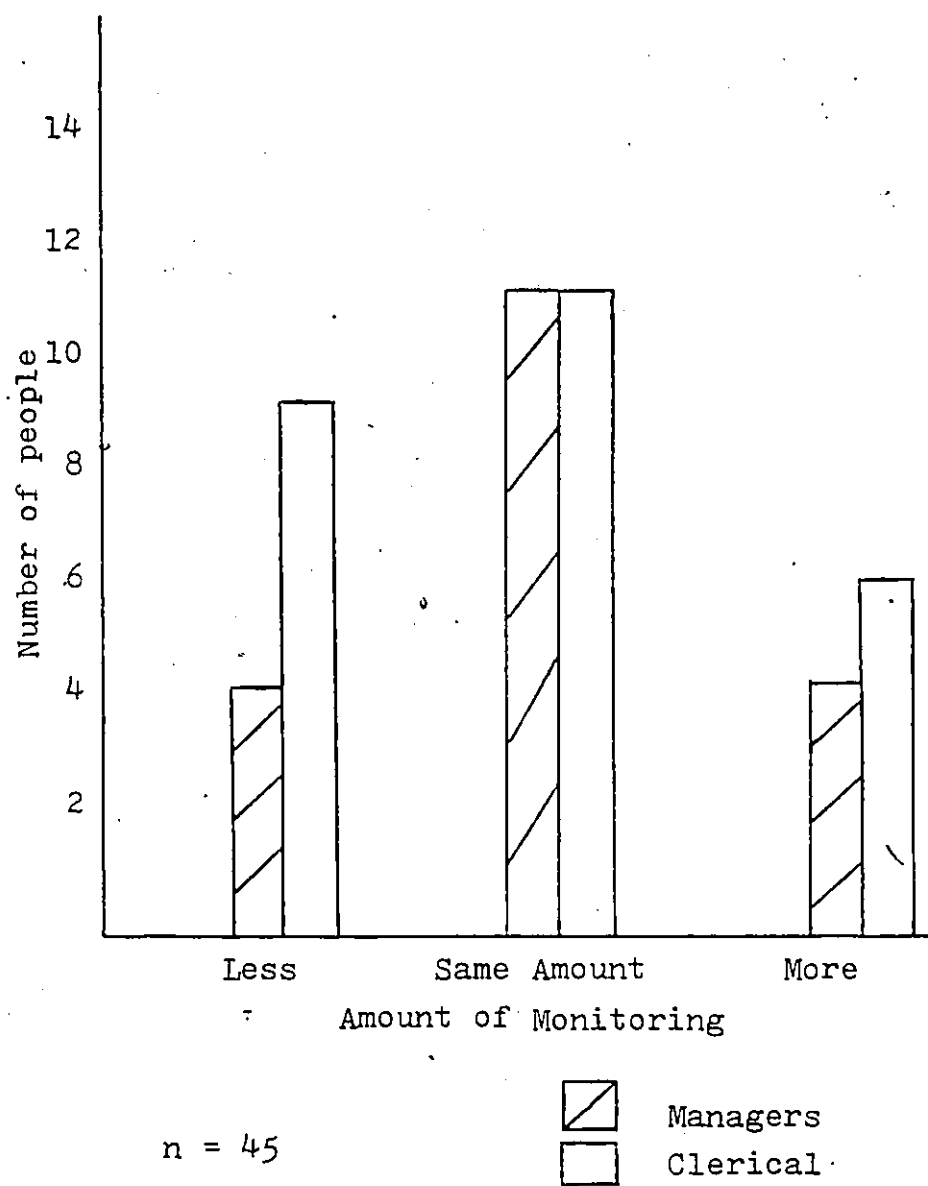


Figure 13. Monitoring of work.

Some employees suggested that monitoring had never been an issue and had not become one since the change. Some increased monitoring occurred, but this was not thought to be threatening for the employees, since it was not stifling and usually diminished as they became familiar and knowledgeable with the system and its capabilities. As knowledge increased it seems that some employees discovered a new tool for enhancing their jobs. Increased freedom and initiative culminated in special projects and many employees felt that these had improved their job substantially. Many enhancements resulting from the automation process are illustrated in the examples found in the previous table. The general consensus was that many aspects of the job had been improved following the installation of the new technology.

Another relevant issue involves the environment in which employees are expected to work. Improved efficiency on the job and increased job satisfaction may be influenced by system functioning and performance. The new technology has brought with it substantial modifications in the office setting, some of which will be explored in the next section.

#### **Adaptation to change in the work environment**

This section focuses on the technology itself. Several issues were asked of the employees 1) does the system cause you problems? (45) 2) what sort of problems? (46) and 3) are they corrected (47) so they do not interfere with your job?



### Performance of the technology

Approximately 60% of those interviewed mentioned system problems of various sorts (See Table 9).

TABLE 9  
System Problems

Source of Problem	Percent mentioning (of 27 responses)	
	n=---	
.hardware failure, system bugs	26%	7
.system 'down' time	26%	7
.slow response time	7%	2
.software limitations	7%	2
.lack of knowledge concerning general system functioning	22%	6
Source of Solution		
	(of all 45 respondents)	
.technicians and systems personnel	68%	31
.other individuals correct problems	76%	34
Efficacy of Solution		
.problems corrected promptly	95%	43

While problems with the technology have been observed by the respondents, the large majority mention that they usually result in only short term delays. Problems were readily corrected by systems personnel and interviewees indicated that they were very satisfied with the timeliness and efficiency of this process.

In summary, interviewees felt that the new technology typically functioned quite adequately. When problems arose,

they were promptly rectified. The introduction of computers resulted in changes occurring in the more global office setting. This environment was thought to have changed in several ways. These will be dealt with in the coming section.

### **Structural changes in the office environment**

With the introduction of automated systems, major alterations have taken place in office design and structure in both organizations. In the case of Hewlett-Packard, increased space was required and the company literally moved the office to a new location. The new facility boasts automated workstations, with specially designed office furniture and proper lighting facilities. Union Gas has also installed furniture tailored to automated workstations (e.g., adjustable desks and chairs).

Fifty five percent of the interviewees remarked that structural changes such as the forementioned had occurred (67) as a result of the automating procedures. In addition to changes in the office layout and equipment, employees reported the following changes:

	Percent Mentioning (of 53 responses)
.increased efficiency with automated equipment	21%
.more people, less space	11%
.increased teamwork and communication	6%
.higher noise level in office - open space concept	8%

When employees were asked whether or not these changes were an improvement over the previous office setting (68), 86% felt the changes did indeed improve their office. Changes in the general office atmosphere are shown in Table 10.

TABLE 10  
Changes in general office atmosphere

	Percent Mentioning (of 51 responses)
.Positive Scenarios 78% of all 45 respondents	
.jobs changing for the better (n=32)	63%
.jobs upgraded-redefined	
.more professional, efficient atmosphere	
.state of the art equipment	
.decreased number of tedious tasks	
.Increased efficiency (n=4)	8%
.increased work output	
.better organizational ability	
.Improved physical layout of office (n=4)	8%
.Negative Scenarios 22% of all 45 respondents	
.reduction of staff and space (n=4)	8%
.colder, more impersonal setting (n=2)	4%
.some resistance to change shown by employees (n=2)	4%
.leads to more work (n=1)	2%
.Other responses (n=2)	3%
	-----
	100%

Changes to the office environment were thought to be improvements by the large majority of respondents. It is interesting that this question (68) once again evoked responses which suggest that the new technology is a helpful tool on the job. Jobs are generally being upgraded and enhanced. Efficiency on the job has also improved with the introduction of computers. While several negative comments were given, it is clear that only a minority of employees felt that improvements to the office had not been beneficial. Both positive and negative aspects of the change process have been suggested in responses to this question dealing with what has already happened. At this point employees were asked to look ahead and anticipate what the future may be like in the office of tomorrow. They were asked to envision: 1) how automation will influence their job in the future? (69) and 2) what will the office of the future be like? (70).

#### Future Influences and Concerns

When participants were asked to focus their thoughts on future implications, it was evident that employees envisioned many possibilities as plausible realities. These questions elicited by far the most responses of any in the interview. On the average, employees mentioned 3 to 5 comments for each of these questions. This is a substantial increase (5X) when compared to previous questions. Evident-

ly, interviewees were enthused when these futuristic topics were posed.

### **Influence on Individual's Job**

Focusing on technological influence on the job in the future (69), generally evoked either positive or negative scenarios (See Table 11). One hundred and four responses were obtained in reply to this question.

Interviewees anticipate a move toward increased use of technology in their jobs, leading to expansion within the defined work role. Increased quality and efficiency are proposed to be a function of additional emphasis on technological aids. Less heavily emphasized, though mentioned, is the implication of a detrimental influence in terms of decreased status, motivation and job satisfaction. This sample overwhelmingly stressed positive scenarios, perhaps resulting in an exclusion of issues focusing on possible negative repercussions.

TABLE 11

## Technological Influence on Individual's Job

Percent Mentioning  
(of 104 responses)

## Positive Scenarios

.more high technology 32% of all 45 respondents

- .increased use of technology in office 6%  
(n=6)
- .can only help, am optimistic (n=10) 10%
- .will influence my job a great deal (n=9) 9%
- .a lot needs to be automated (n=2) 2%
- .machines for filing, electronic mail 6%  
(n=6)

.expansion of job 30% of all 45 respondents

- .better, will decrease workload (n=11) 11%
- .increased challenge, variety in work 5%  
(n=5)
- .I will be able to use my knowledge to  
act as a consultant (n=5) 5%
- .I will learn and grow with the system 5%  
(n=5)
- .allows me to do a better job (n=4) 4%
- .allows more responsibility (n=1) 1%

.increased efficiency and quality  
of work 23% of all 45 respondents

- .will make work easier (n=7) 7%
- .better access to information (n=6) 6%
- .more effective operation (n=4) 4%
- .fewer errors, increased accuracy (n=3) 3%
- .will make work more interesting and  
fun (n=2) 2%
- .records available by which to measure  
performance (n=2) 2%

Table 11 (cont'd)

Negative Scenarios	13% of all 45 respondents
.won't change job more than it has already (n=4)	4%
.will decrease motivation and job satisfaction (n=2)	2%
.will impose additional time constraints (n=1)	1%
.will decrease my status (n=1)	1%
.mechanization has to stop; it is not a good thing (n=2)	2%
	---
	98%

### Office of the future

Interviewees were finally asked (70) to envision the office of the future. From the sample of 45 employees, 187 responses were obtained which again is an extraordinary, striking increase in number of responses. Many similar categories to those found in the last question resulted. Responses concerning the office of the future are shown in Table 12.

Obviously, employees anticipate that a great deal of change will occur in future office settings. A noticeable change in this direction has already been observed by many. Employees also envision changes in job format and structure.

The scenario being projected suggests that the office of the future will not only bring about changes in the setting itself, but will also influence individual jobs to a large extent. With the facility of computers to interlace

TABLE 12

## The Office of the Future

	Percent Mentioning (of 187 responses)
.more high technology, fewer people	42% of total
.totally automated office (n=15)	8%
.terminal on everybody's desk (n=25)	13%
.many more enhancements (n=12)	6%
.paperless office (n=6)	3%
.fewer telephones (n=6)	3%
.no typewriters (n=6)	3%
.electronic mail system (n=3)	2%
.electronic filing system (n=3)	2%
.job redesign	7% of total
.parameters of individual job will change (n=6)	3%
.more professional, specialized work- force (n=8)	4%
.increased job responsibilities (n=2)	1%
.increased efficiency	7% of total
.more efficient methods (n=6)	3%
.produce more, faster (n=3)	2%
.improved accuracy (n=3)	2%
.more timely data available (n=3)	2%
.improved channels of interactive communication	7% of total
.people making decisions with assistance from computers (n=8)	4%
.faster communication links (n=3)	2%
.able to share information via terminals company-wide (n=2)	1%
.electronic cottage	3% of total
.work from the home a possible reality (n=6)	3%
.work from the home will not likely occur (n=2)	1%



Table 12 (cont'd)

.little change in the future	6% of total
.almost there now, like the present office (n=8)	4%
.same atmosphere as at present (n=2)	1%
.robots will not be prevalent (n=2)	1%
.won't change my job, won't affect me (n=2)	1%
.negative projections	23% of total
.will always need personal interaction and contact (n=6)	3%
.depersonalized, less personal interaction (n=3)	2%
.fewer human aspects will be found on the job (n=3)	2%
.people will be replaced by robots - like has happened in factory settings (n=2)	1%
.sterile, austere, robotic - we'll be trained by the computers (n=3)	2%
.should be limits, computers are not a good thing (n=3)	2%
.scary, threatening, hope it stays the way it is now (n=3)	2%
.don't like to think about it, I'm not technically inclined (n=3)	2%
.involves many social implications: will man do away with self? (n=2)	1%
.could be anything, I'm not sure (n=12)	6%
	---
	98%

and link various communication outlets, some interviewees (7%) perceive a move toward improved channels of interactive communication. With communication linkage technically feasible, the possibility of electronic homework or an electronic cottage scenario may be considered. Though this potential exists, very few individuals in this sample (3%)

imagined this prospect. Several interviewees (6% of responses given) do not project a great deal of change in the future.

Approximately one-quarter (23%) of the interviewees anticipate a possible negative scenario of the office of the future. For some individuals the future poses some degree of uncertainty and fear. Whether or not any or all of these projections will occur will remain a mystery which will be answered only when the future becomes reality.

### Correlational Analyses

The correlational data provide a summary of important findings in this study. Several factors have been cited as critical in the acceptance of a change process such as office automation, some of which are found in Table 13.

Seven major categories were highly correlated with the other variables used in this study. These included job satisfaction, amount of input into decisions, change in the amount of responsibility, challenging vs. boring work, involvement in system choice and design, involvement in the implementation process and level of experienced stress.

Persons reporting an increased level of job satisfaction mentioned a subsequent increase in responsibility on the job. They thought their job had become more demanding, more challenging and more interesting. A higher level of satisfaction was correlated with an increased amount of in-

Table 13

Table of Correlations Across Respondents

	satis on the job	input into decision	increase in resp	challeng vs boring work	involve in decision	involve in implemen	amount of stress on job
<b>Demographics</b>							
Level (M,C)					.49**	.47**	
Sex (F,M)					-.45*	-.35*	
Age	-.33*	-.38*					
Time using terminal					-.37*	-.43**	
<b>Company</b>							
Identification with work/home	-.36*		.35*				
<b>Involvement</b>							
Involvement in implement					.73**		
More vs less input into decisions	.39*		.53**		.37*	.37*	-.31*
Training con'd as needed	.37*			.44**			
<b>Aspects of Job</b>							
More vs less demanding work	.61**	.40**	.41**		.33*	.37*	-.32*
Easier work					-.32*		-.35*
Quicker to do work					-.40**		
More vs less flexibility on job							-.51**
Adequate reward							-.39*
<b>Satisfaction on the job</b>							
Increased responsibility	.61**						
Challenging vs. boring work	-.44*						
More vs less interesting work	.31*	.41**	.52**	.61**			
More vs less freedom on the job			.33*	.39*			
More vs less initiative on job				.42*			
More vs less teamwork on the job	.46*						
Improved work environment	-.48*		.48**	.37*			
Increased promo avenues	.32*	.31*	.32*				

\* p&lt;.05

\*\* p&lt;.001

put into decisions and additional teamwork. High satisfaction on the job was negatively correlated with self-concept or role of the individual, which is interpreted as higher job satisfaction for individuals who described themselves as work-oriented persons. Individuals stating high job satisfaction also mentioned that their work environment had improved following automation.

Increased job responsibility was positively correlated with more input into decisions, more interesting and demanding work, more freedom on the job and an improved work environment. Increased responsibility was also related to increased promotional opportunities and identification with the work role. Challenging vs. boring work was positively correlated with more interesting work, ongoing training, more initiative and freedom on the job and an improved work environment.

As for many of the other variables dealing with satisfaction, input into organizational decisions appears to be related to more interesting and demanding work. The negative correlation with age implies that younger employees feel they have more input into decisions. The majority of managerial employees are found in this younger age bracket, with most of them having been with the company and in their present position for less than five years. Input into decisions is also related to increased promotional avenues. These variables pertaining to job satisfaction, emphasize

many of those issues which traditionally have been linked with high levels of satisfaction on the job.

With reference to involvement issues, involvement in decisions was positively correlated with participation in the implementation process, input into decisions and level (high involvement in the managerial rank); and negatively correlated with sex (high involvement for male employees) and flexibility on the job.

While managerial personnel as a group participated in decision making, it is interesting to note that the male managerial staff generally were most involved. This information suggests that the female managers were not as involved and one may question why this difference occurred. Perhaps even in these progressive companies, the influence of the female managers is not as pervasive as that of the male managerial personnel.

When considering changes in the job, more involvement in decisions was correlated with more demanding work but not necessarily easier work. Somewhat surprisingly, it was also related to time spent using the terminal. Those involved in decisions (e.g., managers), spent less time working with the computer system.

Involvement in the implementation process was positively correlated with more demanding work, more input into decision processes, sex and level (male, managerial employees being more involved). The negative correlation with daily

use of the terminal suggests those who are more involved use the terminals less frequently than those who are not involved.

Stress was negatively correlated with flexibility on the job and adequate reward. Lack of flexibility and reward in a job may be related to increased stress. High ratings of stress were related to harder, more demanding work and more input into decisions, suggesting higher ratings of stress for managerial employees.

In summary, satisfaction on the job, involvement in company decisions and experienced stress are related to variables which were thought to be important by employees in the present study. Even though work was thought to have become more demanding and stressful, employees maintained that they were generally more satisfied following automation. Perhaps the high levels of involvement influenced this outlook. Nevertheless, employees typically expressed a global feeling of fulfillment from their work.

#### **Similarities / differences between Union Gas and Hewlett-Packard**

Several differences were found between companies. Chi-square analyses revealed a difference in the change in responsibility on the job as a function of computer technology between companies  $\chi^2(1) = 5.2, p < .05$ . While many employees in both companies indicated an increase in responsibility, more HP employees in total responded in this manner.

Not as many UG employees felt a change had occurred in amount of responsibility. Because of small observed frequencies in the cells, the Yates' correction for continuity was utilized.

It was found that differences in responses to potential promotional avenues as a result of the new technology differed between UG and HP,  $\chi^2(1) = 6.78$ ,  $p < .05$ . Union Gas employees responded in a negative manner more frequently than Hewlett Packard employees, who felt the technology would be beneficial in promotional considerations.

With respect to job related issues, differences between companies were obtained. Perceived change in job approached significance  $\chi^2(1) = 3.41$ ,  $p < .05$ , change in daily schedule was significant  $\chi^2(1) = 4.46$ ,  $p < .05$ , as was having a replacement person assigned to one's position  $\chi^2(1) = 3.81$ ,  $p < .05$ . More participants from UG did not perceive a change in job related activities than HP participants, who generally felt their jobs had changed. The same interpretation accounts for the differences found in the area of change in schedule. Fewer UG employees (40%), indicate an available replacement person for their job if they are absent; HP employees (68%) indicate a replacement person is assigned.

Chi square analyses (Yates' formula) revealed a significant difference in perceived importance of accomplishing something significant while at work between the companies  $\chi^2(1) = 4.28$ ,  $p < .05$ . Union Gas participants were evenly split

between stated degree of importance (unimportant to very important on a four point scale), while more HP employees responded that this issue is a "very important" aspect of their job. It should be noted that all employees responded to this question in a positive manner, suggesting a general concern for significant accomplishments in job related activities.

Similarities were more frequently observed between the two companies. The general categories will again provide an outline for the discussion of similarities. Involvement in system choice and design issues revealed frequencies which showed equivalent numbers responding in terms of involvement or lack of involvement in each company. More employees from both companies would have preferred to have been involved earlier in this process. Larger numbers (UG=64%, HP=57%), were not involved in the implementation process than those who were involved (UG=36%, HP=43%). No differences were found in prior knowledge of computer technology; the companies were evenly split in employees who were knowledgeable and those who were not. A general feeling of apprehension may have preceeded the change (UG=87%, HP=68%). Union Gas employees (86%), and Hewlett Packard employees (95%), felt computer technology would make their jobs better and the majority (UG=64%, HP=86%), have not changed their opinion since the implementation occurred. Both organizations implemented the technology in a gradual manner according to this sample (UG=74%, HP=76%).



Training provided was perceived as being adequate (UG=74%, HP=82%) and ongoing (UG=91%, HP 95%). Employees expressed high confidence in being informed of changes which occur (UG=91%, HP=95%). Employees in both companies state a general "liking" for the new systems (UG=96%, HP=95%). An overwhelming majority chose automated systems over manual procedures (UG=86%, HP=100%).

With regard to work increases, employees agreed that they have worked more since implementation of the system (UG=78%, HP=64%), responsibility on the job has increased (UG=61%, HP=90%), and the job has been made easier (UG=57%, HP=71%) and quicker (UG=86%, HP=77%). The quality of their work has improved according to 100% of the Union Gas employees and 95% of Hewlett Packard employees. Work has become more challenging (UG=87%, HP=86%) and interesting (UG=65%, HP=86%). Additional input into organizational decisions was thought to have occurred by some (UG=17%, HP=40%), while the majority of the sample did not perceive any change in this area.

The total sample stated with certainty that should their job become obsolete, they would be retrained or transferred rather than fired. To the extent they felt their job had become more demanding (UG=48%, HP=71%), the majority felt adequately rewarded ((UG=68%, HP=85%). More teamwork on the job (UG=52%, HP=77%) and more initiative for the employee (UG=95%, HP=82%), was expressed as a result of auto-

mated roles in the workplace. Opportunity to learn was thought to be a very important component of one's job (UG=70%, HP=86%). Changes in the work environment occurred (UG=70%, HP=86%), and were evaluated as being improvements (UG=82%, HP=89%) by the majority of the respondents.

In summary, few differences were observed between Union Gas and Hewlett-Packard, even though they are two very diverse organizations. They have both managed to implement the new technology most successfully, and their employees appear to be quite satisfied with the changes which have occurred.

## CHAPTER IV

### DISCUSSION

The purpose of this study was to investigate the impact of office automation on employees from Union Gas and Hewlett-Packard. Of particular interest were the implementation strategies and subsequent employee satisfaction.

It appears that automation has indeed changed the workplace in these two organizations. Employees who reported greater satisfaction on the job also felt that responsibility and input into decisions had increased, making their jobs more interesting and demanding. Teamwork was considered to be an important component of their job which had increased since automating the office.

Individuals who stated that their jobs had become more challenging and exciting, once again mentioned more interesting work as being a critical factor which resulted from the change to automation. Increased employee input, freedom and initiative on the job added to the challenge.

Employees reported average levels of stress experienced on the job. They felt that stress was related to amount of flexibility in their job, obtaining adequate reward for work produced and perceived level of job difficulty.

Asking for employee input into decisions most often occurred during the implementation process. Male managerial employees were involved in decision making to the greatest extent. Being involved in implementation was related to level, with managers stating the most involvement. Those who were involved in the implementation of the system felt that they also had more input into organizational decisions.

Supplementary findings from the analysis indicated agreement that the technology had improved employee's work. Very few individuals indicated a concern for loss of jobs, suggesting that a high degree of job security is found in these two organizations. These findings concur with Tucker's (1982) finding that employees who are assured their job will be secure will be more accepting of the technological change.

In order for the change to be accepted, Tucker (1982), also stresses the need for adequate training. The majority of employees in this sample agreed that they had received adequate training, reinforced by the fact that training in both organizations proved to be an ongoing rather than a "one shot" process. Thus, adequate training and job security appear to be important factors in successful implementation of computer technology.

Acceptance of a change introduced by an organization will be mediated by employee assessment of the proposed benefits of change (Whisler, 1970). Changes which occurred,

perceived by this sample as being beneficial to the employees, included modifications to the work process itself. Work was thought to have become more challenging and interesting as well as more diverse in nature. Employees were able to take on larger, long term projects and tasks, which were thought to be more demanding and stimulating.

Instead of the job becoming more fragmented and boring, as suggested may occur as a result of automation by Menzies (1982), employees stated they now found more variety in their work which often led to increased responsibility in the form of mini projects or assignments. These additional learning opportunities were thought to lead to more satisfaction derived from the job. These findings are consistent with those obtained by Mann and Hoffman (1960). These researchers reported that automation provided greater variety within the job and increased opportunities for learning.

Generally, the employees' attitudes were very optimistic and pro-technology. Few problems of resistance because of fear of the technology, anxiety about the future, changes in the workplace etc., as suggested by Tapscott (1982), were found in this group of respondents.

Additional variables affecting levels of acceptance of change processes include participation or involvement in the many stages of change. As was previously mentioned, employees stated a limited amount of involvement in this study, with the managerial level included in the implementation.

phase. Socio-technical system supporters (Taylor, 1982) emphasize the need for increased employee participation. Approximately forty percent of this sample were involved to some degree in the implementation stage, which suggests a move in the direction of increased employee involvement. Lucas (1976) concluded that high levels of involvement, knowledge of the capabilities of the system and frequent use of the system, are generally associated with positive user satisfaction.

Several other researchers stress employee involvement in change (Beer & Driscoll, 1977; Tapscott, 1982; Taylor, 1982). Managerial level employees indicated more involvement and knowledge of the system; whereas, clerical or support employees stated more moderate levels of involvement but high knowledge of system changes via continual updates and meetings.

In addition, clerical employees were more frequent users of the system. Both groups of employees, therefore, appear to have had favourable interactions with respect to some involvement, and their subsequent high levels of satisfaction provide evidence that involving employees in and during the change process may lead to greater employee acceptance of the technology.

The acceptance of change may be mediated by the organizational climate or philosophy which has been established over many years and as a result of many experiences with

past changes (Mumford & Banks, 1967). The company philosophy, therefore, may provide a link in change and subsequent employee acceptance. Responses from individuals in this study suggest a high regard for company policies and practices. This was shown by the fact that virtually every employee in the sample was confident that their employer would retrain and transfer them if necessary, rather than fire or lay them off. This feeling was thought to stem from company policy rather than from an individual confidence that they are valuable to the organization. Thus, the philosophy of a company, at least in these cases, may influence employee perception of company treatment and consequences of change may be mirrored by previously set policy and practice.

In summary, from these results it appears that Union Gas and Hewlett Packard have successfully implemented the change to automated office equipment. With employee involvement and input at various stages, adequate training procedures and a positive outlook with respect to company philosophy held by employees, the implementation of change may have been facilitated. Employees perceive the change in a positive manner resulting in a general impression of contentment and overall satisfaction on the job.

This sense of general satisfaction is further exemplified when focusing on the other variables. Supervision or monitoring has not changed according to many of the employees. Little has occurred in the area as a result of automa-

tion directly. Similarly, input into organizational decision making has not changed substantially. With respect to obtained rewards, employees typically feel<sup>o</sup> adequately rewarded at the present time.

Employees reported an increased amount of stress experienced on the job since the implementation of computer terminals. The job duties are often more demanding than they were previous to the change and system failures and problems have added stressors such as the inability to access needed information when the system is down. Tapscott (1982) emphasized accessibility of information as being influential in employee perception of the system. System limitations of various sorts may have added to employee stress level but, generally, employees were satisfied that the system worked efficiently and caused few major problems. System limitations in this study were insufficient to maintain a negative perception of the system. Generally, employees responded in a positive manner when asked how they felt about the automated system.

Following in this positive trend are the results pertaining to the issue of teamwork found on the job. More of the participants felt there had been a change toward increased teamwork than did not. This increase, in turn, often led to increased social interaction. This finding is not in accordance with the suggestion that automation may result in workers feeling alienated or isolated in the work-



place. They do reflect Taylor's (1971) finding that technology may be conducive to the development of team or work groups.

Interviewees were asked to focus on their perceptions of self, both on and off the job. The question attempted to note individual differences in identification with either the job or home/outside interests. Bair (1982) concluded that unsuccessful implementation was a function of employee's concern being focused outside of work oriented pursuits (e.g., non-job related activities). This finding was not replicated in this study. Acceptance of the system was generally high, although most of the participants focused their identification toward interests outside of the workplace. This is not to say work is not important to the employees because, in fact, it was stated to be very important and significant according to the majority of the participants.

Finally, with respect to changes in the work environment, employees were satisfied in most respects with the addition of appropriate furniture, lighting and office design. Changes were generally regarded as improvements.

In the discussion of similarities and differences between levels and companies, it is important to point out that few differences were found. Usually, managers were more involved in system choice and other implementation decisions than were clerical employees. This may have added to managerial level acceptance of the change, but it did not appear to hinder clerical support of the change.

Clerical employees more frequently use the terminals, therefore, adequate training and understanding is imperative at this level. Increased use of the system resulted in expertise, and often brought about an upgrade in position for clerical employees. With respect to the other categories, few differences were found between the two levels. Perhaps in a change process such as automation, the impact on employees is more similar than different.

A few differences were observed between companies. This might be expected since these are two very diverse organizations. Employees from Hewlett-Packard were more optimistic that the technology would lead to increased job responsibility and promotion. They also felt their jobs and schedules had changed to a greater extent than did employees from Union Gas. The fact that they are working in a computer based organization may influence these impressions. Somewhat greater emphasis appears to be placed on significant accomplishments on the job by employees from Hewlett-Packard, although Union Gas employees also felt this was important. The remaining categories did not reflect differences between companies, again reinforcing the fact that more similarities were found in this study.

Individuals employed by Union Gas and Hewlett-Packard tend to be well educated and very work-oriented. Their dedication to the workplace as well as the "people-oriented" philosophies held by these "excellent" companies, merge to

result in the outstanding commitment for both high quality work and high quality of working life found in these organizations.

The results of the present study extend the evidence pertaining to successful implementation strategies of technological change, as well as explore a multitude of other important variables experienced by the employee before, during and after the change process. Thus, these findings project a preliminary outline of necessary change components. The practical value of this research lies in the delineation of critical variables which need to be considered early in the process in order to facilitate the change and ultimately, to increase the likelihood of successful implementation of the proposed change. The two cases presented in this study provide evidence that proceeding in a manner such as suggested, may improve the acceptance rate by those who are involved in or influenced by the change.

If future investigators explore this area further, research efforts will need to be directed toward more rigorous testing of these implementation strategies. Thus, it may be beneficial for researchers to conduct pre- and post-change interventions, which may more accurately reflect the change experienced by the employee. Further exploration of the variables which may be influential in assessing successful components of change would provide greater accuracy and allow for added generalizability of the results.

**Appendix A**

**INTERVIEW**

## Interview

### Personal Background

1. How many years have you been in the work force?
2. Working at Hewlett-Packard/Union Gas?
3. In this position?
4. How old are you?
5. Are you married, or single?
6. How many years of school did you attend? - what area did you major in?

### Before Implementation

7. Did you know anything about computers before you knew they would become part of your job?
8. How did you think they would affect your work?
9. Were people apprehensive?
10. Did you think automation would make work better or worse for you?
11. Has your opinion changed since the implementation of the system?

### Implementation

12. How were you involved in the system choice and design?
13. Would you have liked to have been involved earlier in the process?

14. How were you involved in the implementation of the new system?
15. When was this system put in?
16. Who made the decision to automate?
17. Was the change to automation all at once or a gradual process?
18. How much training was provided for you?
19. Did that seem like it was enough?
20. Does training continue as you feel you need it?
21. How were you kept up-to-date as the system changed?
22. Why do you think the technology was introduced?
23. How do you feel about the new system?

#### Job Content

24. Do you feel workers have adapted to using workstations?
25. And you?
26. What percentage of your time is spent interacting with the terminal?
27. Has the office changed?
28. your job?
29. in what way? (repetitious work, opportunities for learning, more/less productive)
30. Has your workday schedule changed since implementation of the new system?
31. If so, how?

32. Which method do you prefer and why?
33. Do you work more or less now?
34. Does this work involve increased or decreased responsibility and duties?
35. Is your job easier?
36. quicker?
37. More or less flexible with regard to shiftwork or hours worked?
38. Is the quality of your work better or worse?
39. In what way?
40. Has your work grown more challenging and exciting or more menial and boring?
41. How interesting is your work now as compared to before?
42. How much input do you have in organizational decisions now as compared to before?
43. What are the main sources of stress on your job as compared with pre-automation?
44. On a scale of one to seven (one indicating a very low level of stress and seven indicating a very high level of stress) rate the degree you experience symptoms of stress.
45. Is there an aspect of the computer system which causes you problems?
46. What sort of problems?
47. Are these acknowledged and corrected?

48. by whom?

49. If your present job was eliminated, would you be re-trained and transferred or fired if fewer jobs existed?

**Autonomy/Social Interactions/Promotion**

50. How demanding is your job now as compared to before?

51. To the extent your job is more demanding, do you feel adequately rewarded?

52. Have social contacts within the office been altered?

53. Is there more or less teamwork apparent on the job now?

54. Is there a replacement person assigned to carry out your job if you cannot?

55. Does the new technology allow you more or less freedom in your job?

56. Is more or less initiative possible on your part?

57. Is your work monitored now more or less than before?

58. In what way has the system changed your position/status in this organization?

59. Has it changed potential promotional avenues?

60. Are you interested in promotion?

61. Where to in this organization?

62. With your job as a whole, how satisfied are you now as compared to before? Please rate on a scale of one to seven (one being very unsatisfied and seven being very satisfied).



### Importance of Work

63. If I asked you the question "Who are you?", in what terms would you answer? For example, in terms of hobbies, work, family, sports, recreation etc.
64. Could you pick between work or outside interests if only the two were given?
65. How important is it that you accomplish something significant while at work?
66. How important is it for you to have an opportunity to continue to learn?

### Work Environment

67. Have changes occurred in your work environment (furniture, lighting etc.)
68. Have these changes been an improvement or not over past situations?

### Future Technological Change

69. How do you think office automation will influence your job in the future?
70. What will the office of the future be like?

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### VITA AUCTORIS

Mary Ann L. Schmidt was born to Leonard and Helen Schmidt on December 8, 1958 in Walkerton, Ontario. She graduated from Sacred Heart High School in 1975 and from Walkerton District Secondary School in 1976. She received the degree of Honours Bachelor of Arts in psychology from St. Jerome's College, University of Waterloo in June 1980. Since September, 1981, she has been enrolled in the doctoral program in applied social (Industrial/Organizational) psychology at the University of Windsor.